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Standard Voltage

Justification of a "Retrograde" Decision

FIRST impressions of the electrical public generally on learning the Government's decision, reported by us last week, to standardise 240 V for low-voltage distribution were, so far as we have been able to ascertain them, that it was a retrograde step. It certainly is unfortunate that all the efforts that have been made to create "230-V mindedness" should have now gone by the board in this reversion to a discarded standard or, rather, one of a pair of once recommended standards. More than half the number of consumers is already supplied at 230 V and the cost of raising their voltage would clearly be more than that incurred in lowering the voltage of the existing 240-V consumers who form only one-eighth of the total.

Cost of Altering 250-V Systems

On the other hand, examination of the estimates in the table published in this issue reveals that, while the effect of adding or deducting 10 V (well within the permissible margin of plus or minus 6 per cent.) would be slight, the expenditure involved in lowering the voltage on 250-V systems by 20 would be very considerable—about half the amount allowed for bringing in the networks operated at less than 230 V, which would have to be paid in any event.

Another factor, which has especial importance now in view of the prospect of prolonged shortage of material and labour, is the increase in conductor capacity through the adoption of the higher voltage and the consequent possibility of postponing reinforcement of many distribution systems, which would call for appreciably heavier capital expenditure per kVA than it would have done in pre-war years. The saving on this account will be cumulative as extensions become necessary. A further advantage of the higher voltage was pointed out by Captain J. M. Donaldson in the *Electrical Review* of exactly a year ago, *i.e.*, it is usually easier to adjust transformer ratios for raising voltage than to do the opposite.

One Definite Figure

Among those most closely in touch with the practical aspects of electricity supply, the retention of 230 V seemingly found few friends and these as a group compromised by suggesting a band of 230 to 240 V. This would not offer the same manufacturing advantages as one definite voltage, which the power companies were solid in recommending should be 240.

The Minister of Fuel and Power in asking the Electricity Commissioners to discuss with the industry means for giving effect to the prescribed standard no doubt included the financing of the scheme, which may be expected to follow the precedent set by frequency standardisation of a levy on the supply industry recoverable from consumers. There seems to be no obstacle to securing early standardisation within the 230–250-V range. To change over the lower-voltage systems, affecting more than one-fifth of the consumers, is likely in present circumstances to take appreciably longer, but a limiting date for completion should be fixed in order to

avoid any tendency to drift, which has added so much to the cost, increasing with time, of facing what has long been recognised as an inevitable liability. It is of the first importance that domestic consumers should enjoy as soon as possible the reduction in prices of appliances that should follow the ability of manufacturers to concentrate on producing for one voltage only and that they should be in a position to buy electrical appliances without having to worry unnecessarily about their technical characteristics.

Coal Price and Quality

MR. SHINWELL promised the Standing Committee of the House to consider introducing on report stage of the Coal Industry Nationalisation Bill some provision to safeguard the interests of consumers in regard to quality. It is of vital importance to the electricity supply industry, as users of fuel of a relatively low average calorific value, that quality should be related to price. The wartime block increases in price per ton irrespective of the heat value of the coal are a serious handicap to cheap electricity and constitute, in effect, a further indirect subsidy of other coal users at the expense of electricity consumers.

Post-Graduate Training

A LARGE majority of those who took part in the recent discussion at the I.E.E. on post-graduate courses in electrical engineering (reported in last issue) was in accord with the views of the openers as to the need for such extended training. Probably the most significant feature was the emphasis laid on the essential need for close and willing co-operation on the part of industrialists, not only in affording even senior men opportunities during the day for keeping abreast of technical developments but also in facilitating interchange between industry and the universities and technical colleges in order to enable lecturers to retain an up-to-date and practical outlook.

H.V. Cable Accessories

AN example of the amount of research work entailed in designing high-voltage cable was revealed (and more was implied) in Dr. L. G. Brazier's I.E.E. paper last week. Scope for great argument is furnished by the question of whether 132-kV cable would more desirably be insulated to withstand all service conditions or only those found in normal operation, leaving voltage surges to be dealt with by extraneous means. Economic comparisons show the answer to be largely a matter of route length. While it seems at first glance preferable that a cable should be self-contained, there is the consideration that the lesser weight and bulk per kVA obtainable with a reduced dielectric would be in accord with general engineering progress. The porcelain sealing end with semi-conducting glaze described also presents interesting possibilities.

Refrigerator Prospects

ALTHOUGH the present food situation is not such as to encourage the idea of domestic refrigeration, hope must be fostered and there is nothing wrong in going ahead with the programme of providing all new houses with a refrigerator. There were wry smiles at last week's luncheon of the British Refrigeration Association when Mr. Wilmot, Minister of Supply, mentioned that a space was being left in prefabricated houses for a refrigerator—but there were no refrigerators. He explained the shortage as being due to the tremendous shipments of plant to our Forces in the Far East, upon which he congratulated the members of the Association. Now that that demand has abated there will be more for civilian needs and Mr. Wilmot put the value of production during the first half of this year at £2,000,000 of which home supplies would represent £1,300,000.

Air Conditioning

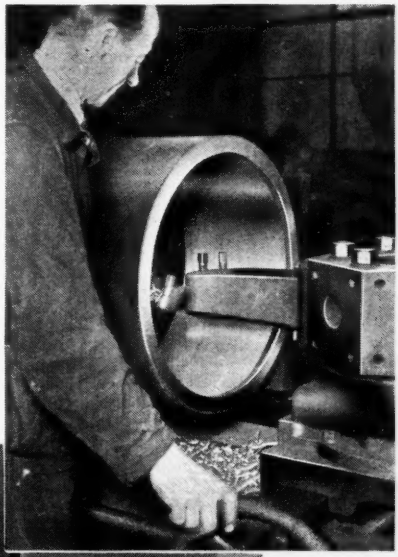
IN another part of his speech Mr. Wilmot commented on our backwardness in the matter of air conditioning. He said that the installation in the new House of Commons would set an excellent standard in this respect. There is no doubt that almost limitless opportunities exist here in the way of air conditioning. Victorian stuffiness still characterises too many of our assembly places, while in others excessive uncontrolled ventilation goes to the other extreme. We do not often suffer from very high or very low temperatures but the smoke and fog prevalent in most of our large towns provide even greater justification for attention to this important matter.

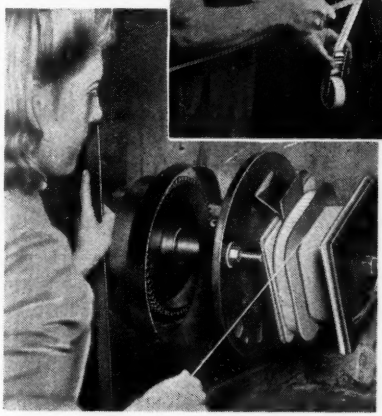
D.C. Motor Manufacture

Specialised Production at a Comparatively Small Factory

IT has always been the policy of the *Electrical Review* to explain to readers how the electrical equipment which they use and supply is made, although our opportunities for doing this class of work were limited during the war years. The electric motor has an overwhelming claim to be given an early place in our revival of this useful work, and particularly the DC motor which has staged such a "come-back" during the past few years for specialised installation work.

We may regard motor manufacture in two very broad classifications—mass production where large numbers of strictly standard units are called for, and individual treatment where the demand is smaller and a good deal of specialisation is required. There is, of course, a good deal of overlapping between these two classes, but it is because the DC motor seems to us to fall more readily into the latter category that we secured the permission of McClure & Whitfield to visit their factory at Stockport and we are grateful to Mr. McClure and Mr. Whitfield and to members of their staff for the assistance they gave us in preparing this article.





The main cylindrical part of the frame is subjected to an interior-face turning operation (above)

Winding the series (centre) and shunt (bottom left) field coils are lathe operations

We have spoken of individual treatment in regard to production methods, but this by no means implies irregular processes; indeed, within each of a number of groups of processes we saw sequences of operations matching many highly organised continuous-flow mass-production schemes, but without the production line conveyor system often associated with very large-scale production.

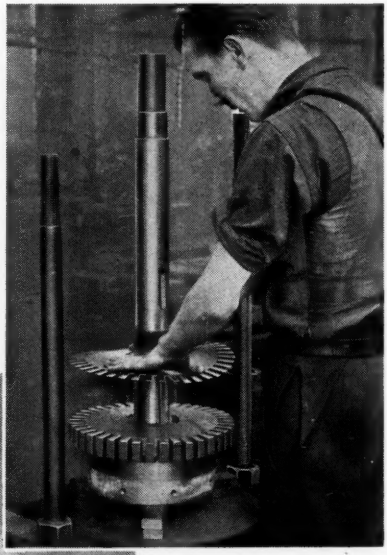
The first of the seven groups of processes

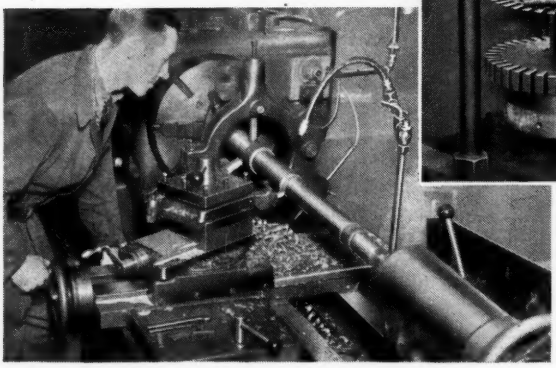
Making the commutator is a sequence group of operations
Left to right—Segments complete with forks, segments in assembly clip, segments in the turning clip, mica washers for "V" rings on bush, commutator bush, complete commutator assembly

which we have selected is preparing the motor frames. The main body, complete with the feet, arrives at the factory as a fabricated structure, while the end shields are received as grey castings. There are about nine different sizes of frames varying from, say, 3 HP with frame dimensions of 24 in. long overall and 12 in. in diameter, to, say, 100 HP with dimensions of 66 in. long and 33 in. in diameter. The preparation work comprises a group of machining operations, and the utmost importance is attached to this work because of the precision demanded nowadays, especially on account of the large number of motors which are required for incorporating in the machines which they are to drive.

In the first place the main cylindrical part of the frame is subjected to an interior-face turning operation during which the metal thickness is reduced by about $\frac{1}{8}$ in. Then, by planing the bottoms of the feet the unit is centred to the base. Other machine operations in this group include drilling the frame for the bolts securing the pole pieces to the frame, and drilling and tapping the ends for the thread bolts for fixing the end brackets to the main frame piece. The end shields are treated similarly, and the operations in this case include very careful machining of the tunnels which are to receive the ball-bearing cases. The accuracy obtained in this latter case eliminates the necessity for shrinking and freezing methods for securing the bearings.

The next operation in this group breaks the sequence of operations for the production of the main and commutating pole pieces, for these are introduced to the frames at this stage, generally without their windings. This is so that the pole faces may be skimmed out to jigs to ensure alignment of the completed frame assembly to suit the exterior

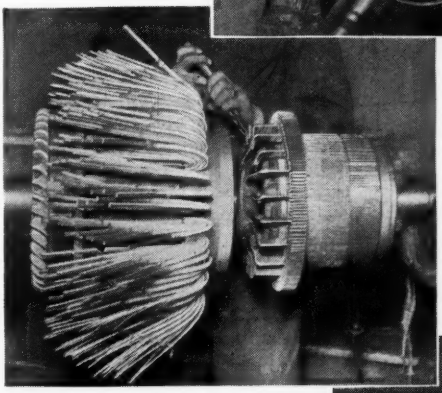




For the reception of the laminations, etc., the armature shaft is mounted vertically. Turning the armature shaft (left) involves some excellent precision machining.

diameter of the armature, *i.e.*. to provide the required air gap. The turning is generally such that the frame-assembly internal diameter is about $\frac{1}{16}$ in. larger than the armature diameter. At this stage the complete frame assembly is sprayed with a rust preventative, and this operation includes, in the case of machines required to be "tropic proofed," shot blasting and zinc coating before the normal spraying.

Core ready for the armature coils

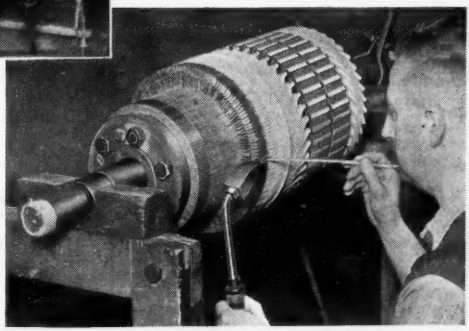


Coil ends are turned back to permit straightening out the equalisers

The next major group of operations is constructing the field system which may be divided into the three sub-groups of making the pole-piece core, the coil lining and the field-coil proper. Mainpoles and interpoles are similarly constructed, so need not be referred to separately. The laminations for the pole pieces are received at the factory already stamped. They are built up to the correct core size, clamped together and then riveted, all as a sequence of bench operations. For any one machine or a number of machines of exactly similar characteristics the first core is built up in the manner described by calculations and measurement of the components but the sets of materials, *i.e.*, laminations, rivets, etc., for all the subsequent cores are individually selected as a whole by weighing each set against the completed first core.

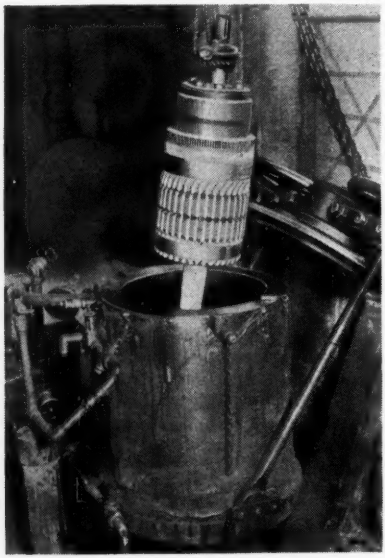
In this way equality of material throughout is obtained, and the scheme is an important contribution to the governing design features of accessibility and interchangeability. A further merit is a considerable reduction in production time. It is at this stage that the interruption in production referred to for the pole-face machining and spraying operations on the frame assembly takes place. After spraying, the pole pieces are removed from the frame for the reception of the coil units.

The field-coil lining, which serves as a permanent former for the windings, is produced from sheet-iron which is first cut to size, bent to shape, riveted and then sprayed for rust protection. At one end of the resulting open-ended rectangular structure a coil-containing lip is turned up, the production of the necessary lip at the other end being left until after the coil or coils have been wound on to the former. As a prelude to the winding operations the surface of the former is first covered with sheet mica for insulating purposes, and the unit is then ready for winding in a lathe.



Sweating the coil ends to the segment forks

In the case of the series winding, a lug which provides for the necessary connection to the next coil, after assembly in the yoke, is first sweated to the end of the flat copper bar which is then wound on to the lathe-

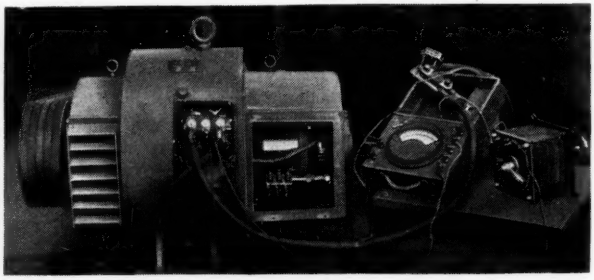


The completed armature spends four hours in the impregnation tank

mounted former and is lap covered with insulating fabric as the winding proceeds. The other end of the coil is left " open " until after assembly in the yoke, when it is drilled and bolted to the first lug connection of the next coil. Fibre spacing pieces are placed on the former during the winding operations —one at each end and one between the series and shunt coils. The shunt coil is constructed in a similar manner to the series coil, except that already covered wire is used in this case.

The coils are now ready for four hours' processing in a steam-jacketed impregnation tank. The first one and a half hours are spent under vacuum in the empty container for the removal of air and damp. Then follows the impregnation proper which involves immersion in the impregnation fluid which is applied at a pressure of 60 lb. per sq. in. Finally there is another one and a half hours' vacuum treatment. The coils are next treated in a gas-heated and jacketed drying equipment from which the heating gases are discharged from the jacket at the side and the fumes from the equipment under treatment are discharged from the central container at the top. According to the size of the work, the drying time and temperature are from five to six hours and from 180 to 200 deg. F. Both temperature and time are automatically controlled. Coils intended to be " tropic proofed " are steeped in a special varnish for about half an hour after the normal impregnation, and then air dried. The coil units are then ready for slipping on to the cores which are again bolted to the yoke as part of the major assembly.

Making the commutator is the next sequence group of operations. The first process in this case is to slot the hard-drawn copper segments for the fork or radial connecting piece to the armature coil end. The segment and bar connection is completed by drilling and riveting, sweating, and cleaning up the faces on a surface grinder. The far end of the fork is given a " U " shape for the reception later on, when on the shaft, of the armature-coil end. Interspaced with strip " Micanite," the segments are bunched and built up into circular form between an inner ring and an outer three-section clip, and after binding the assembly to keep it in formation the clip is removed to give place to a double-ring turning device, both the threaded ends



The final operation is a series of tests

of which pass through the same tightening-up boss. While it is held by the turning clip,

the assembly is introduced to the lathe for obliquely machining the ends which are to fit into the " V " grooves in the end plates of the commutator bush.

The bush is insulated before it receives the assembly which is held between the two end plates, and when these two plates are tightened up axially the whole assembly is drawn together radially by virtue of the engagement of the obliquely turned ends with the " V's " on the plates. The turning clip thus becomes loose and is removed. The complete assembly is then " baked " for half an hour on an open stove to equalise the stresses and to remove dampness. Outstanding importance is attached to this process with which is associated a final tightening up when the assembly is cold again.

Before the commutator is ready for introduction to the armature shaft (in the case of parallel coupled armatures), equalising rings are placed at the back of the commutator and connected so as to link up corresponding segments in terms of potential values. Finally, the commutator unit is subjected to an insulation test at 2,000 V for two minutes.

Armature Building

Next comes the building of the armature, and the first thing to be tackled here is the shaft. Here again there are some excellent examples of precision machining, various sections of the shaft being turned to different dimensions for the reception of the various armature components. The shaft machining operations also include the cutting of the keyways and threading a section for the armature core, and ball and roller bearing locking nuts.

For the reception of, in turn, the first armature end, the laminations, the vent space, the second armature end, and finally the locking nut, the shaft is mounted vertically on a cast-iron assembly bed, in which position the armature core is tightened up and locking nuts are fitted. The core is then ready to receive the armature coils which are first prepared as simple " U "-shaped units and tape insulated in the winding shop. The coil slots in the core are first lined with mica sheet sandwiched between two layers of leatheroid. The armature winder finally shapes each coil at the winding bench immediately before its insertion, and after the coil is securely laid a fibre key is driven longitudinally through each slot, engaging grooves already cut in the walls of the slot and thus covering and retaining the coil.

The coil ends are sweated to the forks projecting radially outwards from the commutator segments, by means of a specially shaped iron. The complete armature is then ready for impregnation and the treatment is precisely similar to that described in connection with the field coils.

After the completed armature has been inserted in the yoke, as part of the major assembly operations, it is ready for two other main components—the ventilating fan and the brush-gear—before the end shields are placed in position. The fan is constructed in the factory from sheet metal, and the construction of the brush-gear involves mainly the assembly of the prepared components as they are received at the works. The rocker is received as a two-part casting which is machined and drilled, and insulating bushes are inserted in the rocker arm holes to receive the brush spindles. Before the end shields are put into position the brushes are thoroughly bedded in.

Apart from finishing touches the motor is now complete and the final major operation is thorough testing. The tests vary slightly for different types of equipment, but the usual test programme is a full-load run for six hours, followed by an overload run for two hours, efficiency and insulation tests, and a careful examination to see that commutation is sparkless and that the bearings run cool.

National Statistics

THE first " Monthly Digest of Statistics " prepared by the Central Statistical Office was made available last week; it is dated January, 1946, and is obtainable from the Stationery Office for 2s. 6d. Although much of the material has hitherto been published in various official papers, *e.g.*, the *Board of Trade Journal* and the *Ministry of Labour Gazette*, this is the first endeavour to bring together in monthly form statistics relating to the country's economic life. Information is given under the following headings:—Employment, fuel and power, raw materials, manufactured goods, building, agriculture and food, external trade, merchant shipping, inland transport, finance, and wages and prices. Included in the fuel and power section are particulars of coal consumption by the electricity supply industry and of electricity generated. The manufactured goods section contains statistics of supplies of domestic electrical appliances for the Home civilian market up to September last, and exports up to November last are included in the external trade section.

With this first issue of the digest is a separate booklet (6d.) giving definitions of items and units. This is essential to the proper understanding and use of the monthly volumes.

Views on the News

Reflections on Current Topics

TO those who had not previously sampled the results of " quick-frozen " food the green peas served at last week's luncheon of the British Refrigeration Association must have been a very pleasant surprise. No other method of preserving these vegetables (and many methods have been adopted) enables them to be served in a state indistinguishable from the freshly-gathered. Rapid freezing is said to preserve the vital juices in their natural positions; slow freezing tends to allow the droplets to merge as ordinary water into larger masses and lose their characteristics. I hope to see a great extension of this preservative method.

* * *

The Dover Town Council has reaffirmed its decision to commence the sale of domestic appliances at its showroom on a small scale and in view of the shortage of equipment the scale could not be otherwise than small. Some discussion took place at a recent meeting when it was suggested that local electrical contractors should be allowed to obtain equipment from the showroom. One councillor objected to the aiding of " competitors " in this manner but I am glad to note that he was promptly told that they were not competitors but co-operators; it was the declared policy of the Electricity Department to work with the local contractors. This " competition " notion is still too prevalent. It is the primary job of an electricity undertaking to sell electricity and if the contractors help them to do this (as of course they do) they are partners, not rivals.

* * *

Conversations with non-electrical people too often recall Mr. Forbes Jackson's recent suggestion that the chief cause of dissatisfaction sometimes felt with the present scheme of things electrical is a feeling that supply undertakings take little interest in the public so long as the latter pays its bills. Almost altogether unjust, of course; yet I can sympathise with the annoyance felt by one would-be consumer, who wishes to use electricity for practically all domestic purposes, at being refused a supply. It seems doubly unfortunate at the present time that the company concerned should have given the high cost of the mains extension as its reason, although admitting the presence nearby of a number of farms. Other difficulties were mentioned, but these were regarded, no doubt incorrectly, by the recipient of the letter merely as excuses. The point is that the undertaking failed to state its case in a way to convince a layman, as it might have done at an interview. My informant, a Conservative in politics, basing his judgment partly on the availability of a publicly owned water service and telephones, with which (as a result of previous experience) he equates electricity, has come to the conclusion that the present supply organisation is something that ought not to be conserved.

* * *

I see that in New Zealand, where registration of wiremen is already compulsory and stringent regulations are enforced governing wiring installations, important new powers have recently been enacted. The Electricity Act, 1945, not only sets up a separate State Hydro-Electric Department (formerly a branch of the Public Works Department) and a Rural Electrical Reticulation Council, but includes a clause authorising and controlling the inspection and testing of materials, appliances and accessories and prohibiting the manufacture and sale of those which do not comply with the regulations.

* * *

Seeking further information on this subject, I turned to the proceedings at last year's conference at Wellington of the Electric Supply Authority Engineers' Association at which Mr. L. B. Hutton, presenting the report of the Faulty Materials Committee, said that he had been staggered at the amount of faulty equipment on the market in New Zealand. The report said that at a conference called by the Public Works Department " it was generally agreed that if a decent article could not be obtained from New Zealand manufacturers, then we should import a good one from overseas." The Engineers' Association, in adopting the report, recommended that the Committee's findings should be conveyed to the chief electrical engineer of the P.W.D. " . . . with a view to his arranging for the relaxation of restrictions on the import of approved electrical appliances and fittings from overseas."

* * *

The recent discussion of rate relief by the Croydon Borough Council has prompted a local ratepayer and electricity consumer to write to a local paper on the subject. He refers to the raising of charges by 20 per cent. in 1940 and says that on a previous occasion the Council congratulated itself on reducing the rates by 4d. in the pound and by taking £22,000 from the electricity profits. He does not seem to be pleased by the fact that he has reduced his rate demand by paying more for his electricity, but then some people are never satisfied. If he were a gas consumer he would have no cause for complaint.—

REFLECTOR.

Cinema Electricians

Scope for Returning Ex-Service Men

By R. N. Paterson

ELECTRICIANS who have been trained in technical branches of one of the three Services may now be wondering what prospects are open to them in the cinema industry when they are demobilised and what experience is needed to obtain a technical position with one of the larger companies. It may be said that men with a knowledge of radio communications and an aptitude for doing a specialised job with rather unconventional working hours are likely to find very interesting work as soon as the cinema industry can get down to its big post-war plans. The projectionist who has possessed the initiative to study and keep up-to-date in applied electronics should be very much in demand.

What the Operator Should Know

Ten years ago the cinema operator was by no means the experienced technician that he must be to-day and he could manage quite well so long as he understood the basic principles of the projector, knew a little about rectification and could do a little wiring if necessary. With the rapid improvement in design of the sound-film projector and the advent of spectacular lighting systems both in the auditorium and for stage effects, a new type of projectionist became necessary. He has now to have a good knowledge of technical electricity, with particular attention to the science of electronics and radio communication, and, in addition, a very complete understanding of the servicing of installations.

Thus, in the modern cinema, the chief projectionist is a competent head of a technical department with usually a staff of six to eight projectionists, according to the size of the cinema. He is personally responsible for the satisfactory condition of not only the projection-room equipment, including the rectifiers, battery charging, projectors, amplifiers and speakers, as well as everything electrical in the building, but he must also have a knowledge of the working of the plenum air-purifying system.

At the moment there is no national scheme for the training of projectionists and electricians, and a great deal of the training of newcomers is left to experienced operators. There are, however, a great many local schemes worked in conjunction with technical schools which are not only providing excellent training classes but are now developing into first-class refresher courses for returning Service men.

The major cinema circuits are proposing to establish schools for new projectionists, in which special attention is to be given to men from the Services. When these schools are fully established they will aim at giving thorough training in the specialised knowledge that is essential for all who wish to reach the top grades.

The Service man, therefore, who has yet to wait a few months before his demobilisation, has a knowledge of technical electricity and wishes to become a cinema projectionist, should study the rudiments of radiocommunications, with special attention to power amplification, the use of public address systems and the microphone, learn a little about the theory of rectifiers (since most cinemas use DC arcs) and know something about the maintenance of electrical installations. If he has the opportunity he should take a correspondence course in technical electricity and, if his service conditions allow, take the City and Guilds certificates in that subject.

With this technical background he should have no difficulty in finding a position with one of the bigger circuits, each of which is now aiming at building up a sound staff of technicians at its cinemas. As new cinemas are built, and there are many plans ready for the day when the removal of restrictions will allow the erection of new cinemas on most up-to-date lines, fresh openings for experienced electricians will present themselves. Nobody yet knows to what extent television will be developed, but there will certainly be a link of some sort and the electronic engineer will have an assured place in this development.

T.V.A. Production

The Tennessee Valley Authority produced 12,000 million kWh in 1945, more than the output of any other integrated system, according to a report presented by the T.V.A. to Congress. This is an increase of 127 per cent. since 1940 and it has "brought to virtual completion the major flood-control and navigational facilities" of the system.

Vibration Problems

Methods of Measurement Discussed

AT a joint meeting of the Installations and Measurements Sections of the I.E.E. on February 14th, DR. A. J. KING read his paper on "The Analysis of Vibration Problems" (*Electrical Review*, February 15th, p. 267). The discussion was opened by MR. D. B. HOSEASON who asked what constituted dangerous vibration and how it varied with frequency. He had found that low-frequency vibrations of considerable amplitude were not dangerous, but he had had considerable experience of very high frequency vibration of small amplitude which could have disastrous results in an hour or two. The vibrograph was of immense value but he took a very poor view of the stethoscope. Had the author encountered trouble due to eddy current problems on the magnetic pick-up? And had he any simple method of avoiding variations when using a magnetic pick-up on a rotating member? There had been a very great advance with strain gauges during the war and they had been used extensively on aeroplane engines, including jet propulsion units.

Admiralty Research

MR. R. S. HOGBEN (Admiralty Research Laboratory) said that the guarantee of calibration accuracy to 2 per cent. had been confirmed by his own measurements up to an upper limit of 500 c/s. Above that limit and up to 1,000 c/s no better than 5 per cent. was to be expected. In this connection his laboratory was developing two electrically-driven tables capable of high acceleration and covering the entire audio frequency range. Measurements of both the noise in air and the vibration of a self-cooled electric motor showed that the principal components were normally due to the ventilating fan, unbalance of the rotor, the magnetic slot note and the bearings. Components originating in the ventilating fan were usually most important from the noise-in-air viewpoint, but only of minor importance compared with the other causes when vibration of the machine frame was considered. Therefore, at the laboratory they were standardising on the direct reading of vibrational velocity in cm./sec., in sets of equipment at present under construction incorporating a moving coil detector of unusual design.

MR. J. R. S. WARING (I.C.I.) asked if the author had investigated the use of his apparatus at different temperatures because in the problems with which he had been mainly concerned, those associated with aircraft, the temperature range was quite wide which had an important influence on the stiffness of rubber. There was need for standardisation in methods of testing rubber and plastics over a really wide range of frequency and temperature. He commended a book which had recently been published by the Ministry of Supply, "Rubber in Engineering."

Lamps in Tanks

MR. L. H. DANIEL (Ministry of Supply) said that in the initial stages it was necessary to fit standard electric lamps in tanks which were satisfactory with rubber tyred vehicles but with steel track vehicles the life of lamps varied from zero to about five burning hours. The lamp makers developed improved lamps and with the aid of the Road Research Laboratory it was possible to give the lamp makers a guide as to the range of frequencies involved. The impulse vibration phenomenon could not be divorced from vibration and the treatment in the paper of resilient mountings was not as complete as it might have been. The damping capacity of metals was also important.

DR. L. E. C. HUGHES referred to the use of cork as a vibration absorbing material; it had been used at the City and Guilds Institute for preventing vibration from traffic reaching the potentiometers and other instruments used there. MR. MASON (B.T.H.) spoke of the reduction of vibration and noise in the case of domestic electrical apparatus and asked if the author had had any experience of correlating noise and vibration on any particular line of apparatus. He also pleaded for some standardisation in the units used in connection with vibration problems.

MR. R. SHINNIE said that in the case of DC motors and AC commutator motors, vibration had an adverse effect on commutation. From the mechanical aspect it was mainly a question of the armature being out of balance but there was also vibration due to the bad collection of current by the brush and an improvement could be made by

ensuring that the machines ran as sparklessly as possible. The CHAIRMAN said he was not at all sure where oscillation ended and vibration began. Was there some critical frequency at which it could be called vibration and some lower frequency which might be called oscillation ?

DR. KING, replying to the discussion, said he felt that for the present they would have to continue giving results in the way called for by the case being considered. It was difficult to say generally when vibration was dangerous. He had done no work on rubber at elevated temperatures, having been more concerned with the performance of the measuring apparatus with frequency rather than temperature. Nor had he done work on impulsive loading. He had not been able to determine the performance of resilient mountings at very high frequencies. He was extending the range of his measuring apparatus and could see his way to going on to about 500 c/s whereas at the moment the limit was about 100 c/s in connection with resilient materials. He had not used cork very much because he had found a tendency for it to pack down. As to when oscillation became vibration, he rather fancied that the distinction was only a question of terminology.

Joints for Pressure Cables

Views on the Use of Surge Divertors

THE paper by DR. L. G. BRAZIER on "Joints, Sealing Ends and Accessories for Pressure Cable" (briefly referred to in last week's issue) was read and discussed at a meeting of the Transmission Section of the I.E.E. on February 13th.

The first speaker was MR. D. B. IRVING (Central Electricity Board) who said the paper was the first to record on a quantitative basis the methods adopted in the electric design of joints and sealing ends. As regarded the method of making the joint, had any attempt been made to evolve a more rigorous mathematical solution of the problem to indicate the order of magnitude of the errors introduced ? He had been impressed with the methodical manner in which researches into the surge strength of joints had been carried out. He was inclined to feel that the number of tests carried out was not sufficient to show with certainty that polarity had any significance. Such experience as there had been on the grid system with 132-kV surge divertors had not been altogether satisfactory.

MR. W. C. BARRY (Henley's) questioned whether the stress cone theory had been fully established and did not think the data in the paper fully supported it. The tests for long period runs were interesting but there was no information about how the joints failed at the shorter period. He did not like filling a cable with gas as described in the paper and preferred the closed-end system.

MR. W. G. STANDRING (N.P.L.) thought there was a tendency to base impulse test conclusions on the results of too few tests. The polarity effects involving surface discharge would vary with the nature of the dielectric. The performance of the author's joint under his schedule of tests give some promise of good performance in service, but more detailed information on pressure cables was desirable.

MR. S. R. SIVIOUR (Yorkshire Electric Power Co.) said the paper contained a large amount of fundamental data of value to the designer. Although the author had suggested that the minimum working stress could well be increased, he (the speaker) considered that would be unwise ; while the author had made out a good case economically for protecting a cable against surges he would rather have a sufficient factor of safety in the cable itself than rely on protective equipment. There had not yet been sufficient experience of the divertor at the higher voltages to be able to rely on it.

DR. J. L. MILLER (B.I. Callender) said that work which his colleagues and staff had carried out had resulted in conclusions and figures which were, in most cases, identical with the author's. Even if surges happened only a few times during the year they involved important considerations of possible trouble in ten years' time. He was glad he had not had to use divertors.

MR. F. R. PERRY (Metrovick) remarked that if change of polarity was a real factor in bringing about breakdown, a switch surge of the type described by the author would be a particularly unpleasant form for the cable to withstand because, although the voltage

might not be unduly high, there would be a big swing of voltage. Nevertheless, he did not think there was any evidence of its being found on overhead line or cable systems, although it had been argued theoretically. It rather seemed to depend on physical conditions and a surge divertor would possibly limit the stress to a more precise degree than any other form of protection which might be adopted.

MR. J. K. WEBB (Standard Telephones & Cables) expressed the view that the author's equations for the calculation of the stress-control profile were based on a fallacy. The author first formulated an expression on the assumption that the field was everywhere radial (that there was no longitudinal stress) and then, on that assumption, proceeded to deduce its value. That might be excusable if a sufficiently good approximation was obtained for practical purposes, but it could be demonstrated that it was hardly in accordance with the facts. It was true that a rigorous determination of the three-dimensional electric field over the transitional region was difficult; nevertheless, a rigid solution was available for the plane-parallel case, first enunciated by Maxwell and applied to the present problem by Loebner in a paper dealing with the rounding off at sleeves and terminations of a metallised cable and the longitudinal stressing of the laminated insulation. While the longitudinal stresses quoted by the author might serve as indices relating to the particular profile he had adopted, they did not represent anything like the true values and, furthermore, he thought that the shape of the profile could be considerably improved.

Non-Uniform Lines

MR. F. G. MONAHAN (Metrovick) referring to switch surge voltages said the values given in the paper were calculated for a uniform line, either a continuous overhead or a continuous cable; but in the case of an overhead line and a short section of cable inserted in the middle of it, the problem was very much more complicated. The final voltage was approached in an oscillatory manner instead of in uniform steps; a small oscillation was superimposed on the voltage step, which had been observed on overhead lines and cable systems. The value of a surge divertor was that it made the conditions much more definite and predictable. Perhaps it would be necessary to have a surge divertor at each end of a long cable.

MR. A. W. AUSTEN (E.R.A.) referring to the impulse behaviour of dielectrics said that the first impulse would do a certain amount of damage; a succeeding one of the same polarity would do very little damage, but as soon as the polarity was changed further damage would be caused. If at any stage there was a long interval between the surges, an impulse of either polarity would again do just as much damage as the first one. He put forward those suggestions tentatively, but hoped that a hypothesis of this kind would lead to consideration of what was the proper form of voltage to adopt. He urged that great caution should be exercised in interpreting results of impulse tests and in devising acceptance tests.

DR. BRAZIER was unable to reply in detail. He said he believed that the performance of divertors would improve provided they were given a chance in field service. The manufacturer could not perfect them without that experience.

American Appliance Production

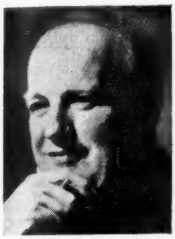
FIGURES are published in the January issue of *Electrical Merchandising* (New York) of the production of domestic electrical appliances in the United States last year, comparing it with production in previous years. The general peak seems to have been reached in 1941, and so for comparative purposes we give last year's figures for the principal items with the 1941 production in parentheses:—Vacuum cleaners 258,000 (2,053,510); heaters and radiators 390,000 (564,000); irons 1,686,800 (5,585,000); radio receivers 250,000 (13,700,000); ranges 74,000 (728,000); household refrigerators 263,860 (3,500,000); washing machines 251,000 electric and gas engine (1,892,435 electric, 122,000 gas engine); storage water heaters 95,000 (205,000); hot-plates and grills 68,600 (547,800); ironing machines 30,000 (259,668). Estimated sales of the major appliances during 1946 are as follows: Refrigerators 2,833,855; ranges 759,590; water heaters 321,365; home freezers 379,795; washers 2,395,630; ironers 409,010; radio receivers 5,083,410; and vacuum cleaners 1,928,190. Manufacturers' production forecasts are well above most of these figures.

It is stated that the total number of electricity consumers in the United States is 29,215,500 and based on this figure and on the number of appliances in use percentages of "saturation" are given for various appliances; they are as follows:—Washing machines 62·42 per cent.; ironers 6·59; ranges 12·12; refrigerators 67·50; radio receivers 83·46; irons 88·90; toasters 56·10; vacuum cleaners, floor 46·90, hand 10·50; coffee percolators 35·40.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. Albert Parkinson,** M.B.E., has succeeded his brother, the late Mr. Frank Parkinson, LL.D., M.I.E.E., as chairman and joint managing director of Crompton Parkinson, Ltd., the British Electric Transformer Co., Ltd., and their associated companies. During the successful business association of the brothers, which started nearly thirty-seven years ago, Mr. Albert Parkinson has been closely connected with the manufacturing activities of the company as joint managing director and works director. The company has a big expansion programme in progress and is fortunate, while suffering the loss of one great leader, to be able to call upon a successor of such experience and ability.



Mr. Albert Parkinson

Mr. L. R. Vincent, has been released from his appointment as technical specialist (communications and broadcasting) Ministry of Information and has rejoined Ritchie Vincent & Telford, Ltd., engineering consultants and agents, as managing director.

Major Kenneth Hawkins, has been demobilised, and has returned to Alexander Hawkins & Sons, Ltd. He has been appointed a director and secretary of the company.

Members of the North Midland Centre of the I.E.E. are to make a presentation to **Mr. K. C. Coop,** who was hon. secretary of the Centre for seven years and has now left the district.

Mr. J. A. Anderson, formerly distribution superintendent with the Scottish Southern Electric Supply Co., Ltd., has taken up the position of assistant mains engineer with the North of Scotland Hydro-Electric Board.

Sir Frederick Bain, a deputy-chairman of Imperial Chemical Industries, Ltd., has been appointed deputy-president of the Federation of British Industries.

Mr. David Meyer is relinquishing his appointment with the Directorate of Communications Development, Ministry of Aircraft Production, at the end of this month and is rejoining Davis Myer & Co., Ltd., electrical contractors, whose temporary address is 20, Beechwood Avenue, N.3 (telephone, Finchley 4566).

The Manchester Branch of the Association of Supervising Electrical Engineers held a social evening at the Engineers' Club on February 9th, to which members' wives and friends were invited. After dinner the immediate past chairman of the branch, **Mr. W. Gregg,** was presented with a certificate by the chairman of the Association, Mr. J. W. Noble. This was followed by an excellent entertainment.

Mr. V. J. Wilson, for the past thirty-six years manager of the B.I. Cables organisation in Scotland, has retired. He was originally with the Helsby Cable Co. His colleagues recently entertained Mr. Wilson at a dinner when a silver cigarette casket and a cheque were presented to him.

Mr. R. H. Lomax informs us that he has left British Insulated Cables, Ltd., to become representative in the Chester area for Enfield Cables, Ltd.

It has been decided to revive the N.E.S.C.O.E. Association and the annual dinner is to be held at Frascati's, London, on April 3rd. The hon. secretary, **Mr. W. G. Bass,** 36, Kingsway, W.C.2, will be glad to hear from old members as well as any former employees of the North-Eastern Electric Supply Co. who would like particulars of the Association.

At the Wimbledon Corporation Electricity Works on February 11th a presentation was made to **Mr. W. J. Oswald,** A.M.I.E.E., on his retirement from the position of chief assistant engineer after forty-two years' service. The presentation, which was made by the chief engineer and manager (Mr. Norman Elliott, O.B.E.) before a large and representative gathering of the staff, took the form of a cheque for the purchase of a radiogram and Mr. Elliott also presented Mrs. Oswald with a spray of flowers. Mr. Oswald is succeeded by **Mr. A. H. Shotter,** who has for some time served as mains engineer in the Department.

Mr. W. J. Oswald

Mr. A. J. Hutchinson, A.M.I.Mech.E., A.M.I.E.E., the chief electrical engineer and manager of the Farnworth (Lancs.) municipal electricity undertaking for thirty-five years, is retiring at the end of March, and the Electricity Committee has placed on record an appreciation of his forty years' service with the authority. Mr. Hutchinson reached retiring age last year, but agreed to remain for a further period. He received his technical training at Bolton Technical School and Owen's College, Manchester. He went to Farnworth in 1905 as station superintendent and two years later was promoted chief assistant engineer. In 1910 he succeeded

Mr. R. B. Leach as chief. He has held many important positions in connection with the electrical industry, including chairmanship of the Bulk Supply Committee of the I.M.E.A. on which he was representative of the smaller electricity undertakings for seventeen years.

Mr. J. Visman, managing director of Philips (Blackburn) Works, Ltd., since its inauguration in 1938, has left to take up a similar post at the Philips works at Hamilton, Scotland. He has been succeeded by **Mr. F. A. Kloppert,** works director to the Mullard Radio Valve Co. (an associated concern) at Mitcham. At the works annual ball on February 14th, Mr. Visman was presented with an old Italian silver inkstand overlaid with gold and Mrs. Visman with a powder compact.

Lieut.-Commdr. W. D. Sutcliffe has now been demobilised and on his return to the Lancashire Electric Power Company has been appointed superintendent of the Testing and Meter Department.

Mr. P. A. Rowland, after five years' service with the R.A.F., is joining the Dorland Electric Co., Ltd., on March 1st, as general manager.

Mr. Clifford Booth, chief engineer and manager of the Spenborough Electricity Department, has been appointed chief electrical engineer at Dewsbury in succession to Mr. G. H. Sammons, who was recently appointed to Barnsley.

Mr. R. H. Rawll, M.I.E.E., M.I.Mech.E., sales and development engineer to the Birmingham Electric Supply Department, has been appointed chief electrical engineer to the Shoreditch Borough Council at a salary of £1,250 plus £60 war bonus. He succeeds Mr. P. C. Ebner who is retiring. Mr. Rawll was educated at the Grocers' Company's School and at the Hackney Technical Engineering Institute. He was also technically trained with Dick, Kerr & Co. During the 1914-18 war he served in the Royal Engineers and the R.A.F., and then served as a pupil to the chief electrical engineer of the L. & N.W. Railway. In 1922 he joined the Birmingham Electric Supply Department as assistant district installation engineer, subsequently becoming district installation engineer, assistant frequency charge engineer and frequency charge engineer, in which capacity he was responsible for the extensive conversion from 25 to 50 cycles. He was appointed to his present position in 1936.

Mr. R. H. Rawll

Mr. Rawll held the command, as a major, of a Territorial A.A. battery and was "embodied" at the outbreak of war but returned to his civilian duties in 1940. He commanded the Department's Home Guard. He has been active in E.D.A. affairs as chairman of the Central England Area and he has also served on the National Executive Council of the E.P.E.A., the No. 5 District Joint Board, the N.W. Midlands J.E.A. and as hon. secretary and chairman of the South Midland Centre of the I.E.E.

Mr. W. G. Millington, charge engineer in the Whitehaven Corporation Electricity Department, for twenty-six years, retired on superannuation on January 31st. Colleagues presented him with an electric kettle and a fountain pen, Mr. L. B. Hogarth, borough electrical engineer, handing over the gifts.

Mr. F. W. Raw, of Oswaldtwistle, has been appointed assistant chemist at Blackburn power station.

Mr. J. S. Wills has been appointed a director of the Electrical & Industrial Investment Co., Ltd., in place of the late Mr. A. W. A. Chivers.

Mr. A. J. Heelis, who for seventeen years has held the position of installation superintendent with the Coventry Electricity Department, has resigned to take up a partnership in an electrical contracting concern in the city.

Mr. N. G. Dunning has been appointed secretary of the Electric Power Boards and Supply Authorities Association of New Zealand, in succession to **Mr. E. W. Swain.**

Warrington Corporation Electricity Committee has appointed **Mr. E. Emerson,** of Wembley, as station combustion and efficiency engineer at Howley power station.

Mr. F. N. Judson has been appointed sales manager of the Vacuum Oil Company's London industrial branch.

The nineteenth annual sports of the Indian Cable Co., Ltd., were held in fierce tropical sunshine on January 19th at Tatanagar, Bihar. The pavilions, seating accommodation and the embankments were packed with thousands of spectators, including members of the Allied forces. The outstanding event of the day was the winning of the tug-of-war by the clerks of the general office, who surprised everyone, themselves included, by defeating the Punjabis. The programme ended with drill, skipping display and Bratachari dance by the daughters of employees. After tea the prizes, including the " Cableco " championship cup and British Electric Co. cup, were presented to the winners by Miss Jean McIntosh.

Appointments Vacant.—Among the many positions advertised in this issue are the following:—Chief engineer and manager for the Stretford and District Electricity Board; borough electrical engineer for Farnworth (Lancs); chief electrical engineer and manager for Turton (Lancs); deputy engineer and manager for Winchester; consumers' engineer for Aberdeen; and mains superintendent for Beckenham.

Obituary

Mr. Ernest E. Mathers, A.M.I.E.E., electrical engineer and manager to the Adwick-le-Street Urban District Council since 1927, died on February 13th. Before going to Adwick-le-Street he was for ten years in the Bradford Electricity Department, manager for Waddington & Co., assistant to the district engineer at Doncaster of Callender's Cable & Construction Co., Ltd., and in the electricity department of the Doncaster Collieries Association, Ltd. Mr. Mathers was sixty.

Mr. T. R. Martin.—We regret to learn from Lieut.-Cdr. R. B. Martin, R.N.V.R., that his father, Mr. Thomas Richard Martin, died on February 13th at Rodcombe, Aston Subedge, Campden, Glos. Mr. Martin, who was sixty-six years of age, was for many years with J. H. Tucker & Co., Ltd., Tyseley, Birmingham, and was later a director of British National Electrics, Ltd., and Archibald Low Electrics, Ltd. It was, however, as a supporter of the British Industries Fair (Birmingham Section) that he was best known. He was for a number of years a member of the Management Committee and served for a period as chairman and vice-chairman. He was also one of the original members of the Electrical Advisory Committee, of which he acted as chairman, and later was hon. secretary of the Electrical Exhibitors' Committee.

The late Mr. T. R. Martin

Mr. W. Burton.—We regret to announce that Mr. William Burton, M.Eng., M.I.E.E., died on February 10th at the age of fifty-nine at his home in West Hagley, Worcestershire. Mr. Burton was born at Northwich, Cheshire, and was educated at the Central High School, Manchester, and Liverpool University. Before joining Ferranti, Ltd., at Hollinwood in 1909, he was with the National Telephone Co., Ltd. From 1914 to 1919 he served with the Royal Engineers, and from 1919 to 1924 he was with the Birmingham & Midland Omnibus Co., which at that time was associated with the S.W. & S. Electric Power Co. He was transferred to the latter company in 1924, and continued with it until the time of his death, when he held the position of assistant distribution engineer and chief technical officer. During the session 1934—1935 Mr. Burton was chairman of the South Midland Centre of the I.E.E.

Mr. J. A. Brown.—We regret to record the death, at his home in Glasgow, on February 10th, at the age of fifty-four, of Mr. John Alexander Brown, Scotland area manager of David Brown & Sons (Huddersfield), Ltd. Mr. Brown was president of the Association of Mining Electrical and Mechanical Engineers in 1934. He took over David Brown & Sons' Glasgow office in 1924 and fourteen years later resigned on his appointment as chief mechanical engineer of the Wemyss Coal Co., Ltd. He resumed his former position with David Brown & Sons in January last year.

Mr. J. J. Fasola.—We regret to announce the death on February 7th at the age of 64 of Mr. Joseph John Fasola, M.I.E.E., A.C.G.I., M.Inst.F., who for the past fifteen years had been London technical sales manager to Lodge Cottrell Ltd. Mr. Fasola received his training at the City & Guilds College, Kensington (then the Central Technical College). After a term as London manager to Sandycrofts, Ltd., he became chief engineer to J. B. Corrie & Co., of Paris, and later managing director of the Luth & Rosen Electric Co. Mr. Fasola was then appointed deputy chief engineer to David Brown & Sons, Ltd., Huddersfield, a position which he held until joining Lodge Cottrell, Ltd.

Mr. M. H. Kilgour.—We regret to hear that Mr. Martin Hamilton Kilgour died at Sidmouth on February 5th, at the age of eighty. Mr. Kilgour was born at Cheltenham and educated there and at Fettes College, Edinburgh, Finsbury Technical College and the City and Guilds of London Institute. He joined the Brush Electrical Engineering Corporation, Ltd., but in 1892 resigned his position of assistant to the chief engineer to advise the Cheltenham Corporation in the establishment of its electricity undertaking. In 1894 he was appointed "electrician" to the Corporation under the borough engineer, but three years later he assumed charge of the undertaking as borough electrical engineer. Owing to ill-health he relinquished the position in 1905 and went to the United States where he occupied many posts, largely connected with mining. He returned to this country in 1914 and served throughout the war as a D.O.R.E., being awarded the M.B.E. For a period he was representative in Cardiff of T. Sugden & Co., but retired in 1925. Mr. Kilgour was formerly a member of the Institution of Electrical Engineers and other leading engineering institutions and he participated in the production of a number of technical papers and books.

Mrs. E. F. J. Holcombe Hewlett.—We are sorry to learn of the death on February 15th at Mansfield at the age of seventy-eight of Mrs. Ada Elizabeth Nicholson Hewlett, wife of Mr. E. F. J. Holcombe Hewlett, M.I.E.E., who was borough electrical engineer of Mansfield from 1902 to 1937. Mr. and Mrs. Hewlett celebrated their golden wedding in 1941.

Will.—The late **Mr. C. G. Tegetmeier,** a pioneer of electric tramways and a director of the Northmet Power Co., and formerly chairman of the South Metropolitan Electric Tramways & Power Co., left £75,946 (£73,719 net personalty).

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions

Barrage Balloon Lighting

REFERRING to the note in the *Electrical Review* of January 25th, on the lighting of the Southern Railway marshalling yard at Feltham by means of a barrage balloon, a similar idea occurred to me during the war period with the exception that instead of suspending a lighting ring, I thought that use should be made of balloons for reflecting the light down from one or more searchlight beams.

The balloon would, of course, be painted with aluminium, or alternately a large mirror reflector could be suspended from it. To prevent the balloon from moving out of the line of the stationary beam or beams a three point anchorage could be arranged.

Such a method of lighting could be utilised above large squares of towns and cities to advantage. There should be an ample supply of surplus balloons and searchlights to meet this proposal.

*Finchley, N.*3. A. P. BROWN.

Choice of Textbooks

I DO not think your correspondent " Vernon Royal " will be able to find a textbook on the design of fractional-HP motors. I would, however, refer him to the paper presented by N. F. T. Saunders to the I.E.E. in 1939 on the subject and reprinted in the I.E.E. *Journal*, Vol. 85, No. 512, which I believe would be of some help to him.

" DESIGNER."

Cable Fault Location

THE possibility of applying pulse and frequency modulation methods on radar-like principles to fault location on high-frequency telephone cables of the wide-band coaxial type is dealt with by MR. F. F. ROBERTS (G.P.O.) in a paper submitted to the Radio Section of the Institution of Electrical Engineers.

The paper commences with a summarised theoretical investigation of the subject and then describes a practical fault locator employing DC pulses. Factors which determine the choice of the transmitted waveform and those which limit the accuracy of location attainable are discussed.

Although a frequency modulation system, which is examined in some detail, would be attractive in certain circumstances, the author concludes that the practical advantages of the pulse type of locator are clarity and reliability of its indications when more than one fault exists in the cable being tested.

The DC instruments described, a number of which have been in service use for some time, enable coaxial cable faults to be located within one per cent. of their true distance at ranges up to ten miles.

Swiss Electric Locomotives

WITHIN the last two years eight 106-ton electric locomotives have been put in service on the St. Gotthard line of the Swiss Federal Railways, bringing the total of this type up to twelve. On the mountain route they are reported to attain a maximum speed of just over 53 m.p.h. Each locomotive, which is made up of two units, has four driving axles and a bogey at each end, a driver's cab at each end, two overhead current collectors and duplicated control equipment. Its overall length (over buffers) is 56 ft. 5 in., and the total wheelbase is 40 ft. The adhesive weight is 80 tons. The driving and bogey wheels have diameters of 4 ft. 5 in. and 3 ft. 1½ in. The driving axles are each operated through oil and dust-tight 1 to 3·22 reduction gearing by two AC single-phase motors supplied from the 15-kV trolley wire through a transformer and mounted on the engine frame at equal distances from the buffers.

The traction motors, which have a total continuous rating of 5,400 HP, have welded housings, rotor spiders of cast steel (owing to war difficulties) and ring-lubricated bearings. Owing to scarcity of copper, aluminium has been used for the stator windings. A marked reduction in total weight has been attained, mainly in connection with the electrical equipment, which accounts for 48·8 tons of the total weight.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

India.—Bombay firm of importers requires quotations for refrigerators, air conditioners, radio apparatus, telephones and accessories, fractional-HP motors, pumps, battery chargers, etc. (X.147.)

Tunisia.—African department of French concern wishes to represent British manufacturers of domestic electrical equipment, particularly refrigerators, lamps, radio sets and other electrical apparatus in French North Africa. (X.148.)

Relay Testing

Primary and Secondary Injection Tests

By W. M. Gore,
Associate I.E.E.

THAT a relay does not stick and can be operated by hand only proves that the trip circuit is in order. It gives no indication of current in the relay circuit; in fact, the current may be short-circuited by faults or by mistakes in carrying out wiring alterations. A much worse fault is an open circuit caused sometimes by loose connections or wires breaking through vibration. Another fault, not ordinarily visible, is a bad connection.

The correct way to test a relay is by injecting a current into the circuit causing it to work in the same way as a fault or overload would do. Of the two methods primary injection is the better, for the testing current is put through the primary of the current transformer, thus ensuring that it has no loose connections, that the secondary side is equally satisfactory, that the wiring to the relay is sound and that the relay operates. Observations on the testing gear will indicate if any of these parts is inefficient; the position of the resistance should be about the same for each phase.

When testing relays, graphs should be made for each type by plotting time against secondary current so that any sluggishness or, in induction relays, disc rubbing will be at once apparent at the lower current settings.

A varnished routine card of the kind shown in Fig. 1 should be hung near the main switchgear. It should give the name of the switch, the connected load in A and kW or kVA, the current-transformer ratio, the relay settings of time lag and overload and, finally, the time and minimum current required for tripping the switch.

When testing relays with either primary or secondary current, all connections should be checked for tightness; this entails making the circuit dead and earthing it, making sure that the tester itself is not earthed on the injection-current side of the transformer. The tail and bus-bar links on cubicle gear should be withdrawn and locked off until the job is completed. On metal-clad gear the switch should be racked out and the bus-bar doors locked off; then the extension plugs for switch operation can be put in during the test.

On metal-clad gear the current transformers may be either on the switch truck, in which case the testing leads can be connected to the switch plugs, or they may be installed just above the cable box. If a potential transformer socket is just under the latter position, the primary-injection current leads can be connected one to this socket and one to the switch plug, thus allowing the current to flow through the current transformer. Where this is not possible, the cable is short-circuited at the far end and injection current is passed through two cores at a time, but as the volt drop is sometimes higher than the normal primary-injection tester will give, secondary injection testing is usually resorted to after initial primary injection with the gear open and accessible.

The best way to take a secondary injection test is, after making the circuit dead, to disconnect one of the current leads to the relay and connect one testing lead to the wire and one to the relay so that the injection current will flow through the wiring, the current transformer and the relay, just as it would under fault conditions; all the circuit will then be tested except the c.t. primary (Fig. 2). By taking the voltage across these two leads the VA can be checked with the c.t. rating and abnormal readings will indicate overloading or bad connections.

The testing current can now be switched on at a very low value and increased by means of

RELAY SETTINGS

Circuit	C.T. Ratio	Relay Setting	Time Sec.	Current		Full Load	Cable Size sq. in.	Remarks
				Pri.	Sec.			
Works Trans. No. 1	50/5	100 per cent.	2 2·3 2	50 50 50	5 5 5	125 kVA 11 A	·015	Interlocked O.L. Protection
Gen. No. 6	500/5	Balanced Current	0·5 0·5 0·5	65 65 65	0·65 0·65 0·65	6500 kVA 580 A 08 p.f.		Exciter (110 V 300 A)
Feeder No. 1	200/5	150 per cent. 3 secs.	2·5 2·7 3·0	300 300 300	7·5 7·5 7·5	284	0·2	Feeds Transformer Chambers 3, 6, 13, 24

Fig. 1.—Routine card of relay settings

a finely graded resistance; a water resistance is very suitable. If the relay operates by means of a revolving disc, at the first movement of the latter the reading on the ammeter (which should be near to the relay) should be noted. The disc is then watched for continual and steady rotation until the switch trips out. Only a slight increase in current should have been necessary after the disc has started to move and the current at which the switch trips should be observed.

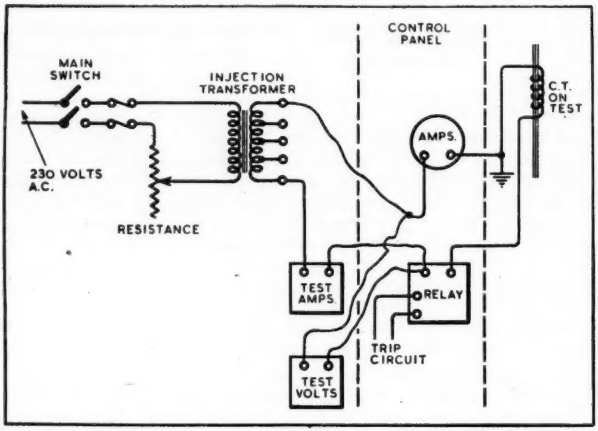


Fig. 2.—Circuit and secondary-injection tests of overload protection gear

Having now ascertained the minimum current required for tripping and having checked the steady operation of the relay, the latter is then checked for normal setting. This is done by bringing the current up again slowly until the required setting is reached. When this point is arrived at the switch will have tripped and the injection current should be switched off, leaving the resistance alone. Then close the main switch, start the stopwatch or clock as the injection switch is closed, and stop it when the switch trips. Open the injection supply switch, and if necessary take another test for comparison. After making a note of the readings treat the other phases in the same way.

A wipe with a pipe cleaner down the gaps of the magneto and round the spindle near the pivots generally cures a sluggish disc, but a bent disc should be discarded as straightening seldom proves satisfactory. The contacts can also be wiped down with the pipe cleaner; if they are greasy or made of metal the cleaner should be damped with carbon tetrachloride. All connections should be tried for tightness. The test should always be carried out with the cover on, as the tension on the cover has been known to alter the setting where the relay has been mounted on a slightly uneven surface owing to the movement being sprung out of line.

A primary-injection tester was constructed from two old 500/5 current transformers (the only ones which were available at the time) mounted on a trolley and an earthenware

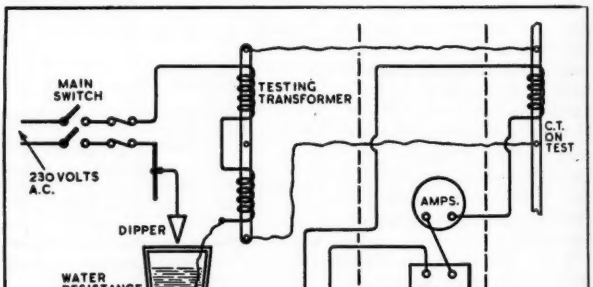


Fig. 3.—Improvised primary-injection arrangements

bread mug, insulated from earth with a copper dipper (Fig. 3).

The secondaries were in series with one another and also with the water resistance. Normally the primaries were also connected in series to take advantage of the higher voltage up to 500 A, the maximum current normally required.

The bread mug holds about 2 gal. of water; soda ash is added, so that the dipper has a useful working range. A copper plate resting on the bottom forms one electrode, which is connected by insulated wire through the liquid to the testing gear, the dipper being the other connection. The pot should be insulated from earth. A better form of resistance may be made with carbon rods and a slider when these become available.

Where the relays are some distance from the switchgear, a field telephone (two hand sets with a battery and trailing connections without bell) regulates the primary current, a man working the dipper to the instructions of "Switch on! Down! Down! Stop! Down! Switch off!"

A secondary injection tester was made from the core of a re-wound oil-immersed current transformer. Eight turns per sq. in. of effective core are suitable so that if the core is 2 sq. in. 920 turns are required for 230 V. The other winding must be suitable for the burden of the highest-rated c.t. in the works, and 50 VA will generally cover this. The winding will then have to give 5 A at 10 V as c.t.'s are now generally rated at 5 A. At four turns per volt the winding requires 40 turns and these should be tapped at every tenth turn. For carrying 5A 14 s.w.g. will be required allowing 10 A intermittent load at 2,000 A per sq. in. Allowing an efficiency of 80 per cent., the primary will have to give 62·5 VA or 2·7 A (approximately), so that 25 or 26 s.w.g. is suitable for the 960 turns.

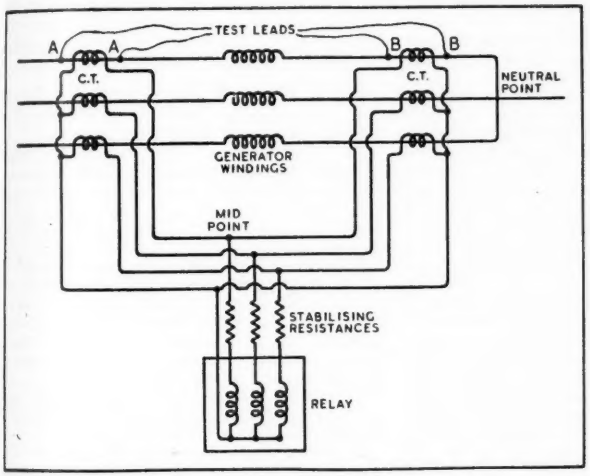


Fig. 4.—Secondary injection and balanced protection

Coarse adjustment is made by using the tappings on the low-voltage side and fine adjustment by means of a variable resistance in series with the 230-volt winding.

Balanced protection can be tested by connecting the primary-injection test leads across one of the c.t.'s either AA or BB, thus causing an out-of-balance current to flow. The ammeter should be connected in one of the metering c.t.'s. For a secondary injection balance test, the tester leads are substituted for one of the c.t.'s, *i.e.*, one transformer is dead and one alive, thus giving an out of balance load in the relay (Fig. 4). Routine tests on the above lines should be carried out once or twice a year.

Special Measuring Instruments

INSTRUMENTS for special purposes were dealt with at last month's discussion meeting of the Measurements Section of the Institution of Electrical Engineers. Mr. R. W. GRIFFIN introduced the subject, commenting mainly upon methods of measuring temperature, the determination of relative humidity, gas mixture analysis and heat-loss in unburnt flue gases of steam boilers.

The scope of the debate was extended in the subsequent general discussion during which speakers mentioned many different kinds of instruments for measuring a wide range of physical quantities. It was made clear that advances depended largely upon the availability of robust and stable amplifiers, which enabled relatively unskilled users to measure extraordinarily small quantities.

Refrigeration Industry

Speeches at the B.R.A. Luncheon

ABOUT five hundred members of the British Refrigeration Association and guests attended the Association's annual luncheon at the Connaught Rooms, London, on Thursday last week. Mr. E. G. Batt, independent chairman of the Association, presided, and the principal guest was Mr. J. Wilmot, Minister of Supply.

After the lunch, which included some excellent "quick-frozen" green peas, the toast of the Association was proposed by Mr. Wilmot, who referred to the growth of the popular demand for refrigeration. In the near future no home would be considered up to standard if it did not possess a refrigerator. He took the opportunity of thanking the refrigeration industry for its work on behalf of the Forces in the Far East. Altogether the contracts placed for this purpose amounted to over £10 million; the plant involved, embraced domestic-type refrigerators, ice-making plant, cold storage plant and mobile equipment.

With the ending of war contracts it had been possible to approve a programme of production of domestic, industrial and commercial equipment to the value of £2,000,000 for the first half of this year; of this, £1,300,000 worth was for the Home market. In all the prefabricated temporary houses space was being provided for refrigerators, although at the moment it was not possible to provide the equipment.

Undeveloped Applications

Air conditioning, with which the refrigeration industry was also concerned, was so far little known in this country but there was a tremendous scope for it here. Quick freezing, too, had not been taken up in this country with the enthusiasm which it deserved. No better method of preserving food for future use had been evolved and he hoped to see it greatly extended. Refrigeration, Mr. Wilmot concluded, was one of the most wonderful modern technical developments available for our use. By proper organisation we could make this and other advantages available to the common man.

In the course of his response to the toast, Mr. Batt mentioned that during the past year the sectional membership had risen from 247 to 303 firms and about sixty sectional and committee meetings had been held. Since the last luncheon the war had ended and the country was facing the problems of reconversion. We had been completely mobilised for war with the result that upkeep and maintenance had had to be neglected and this burden of arrears was added to that represented by a vast number of destroyed and damaged buildings.

Our mobilisation for destruction had also prevented us from keeping our export trade going. We had achieved victory and maintained liberty at a great cost. But we should continue to stand on our own feet although for a time our lives would not be soft or easy. If we did not fall out among ourselves, appreciated the possibilities, and had faith and energy, we should assuredly re-assume the pre-eminent position among the nations of the world which we held for so long.

Essential Export Trade

If we depended entirely upon our own resources we could sustain life only on a low plane. Our standard could only be kept high by exporting and we must be determined to produce at competitive prices and on a scale never before thought of. For many years there was unlikely to be a shortage of demand. The testing time would come when arrears had been made up; then the new and as yet untried technique for maintaining full employment by Government action would be put to the test in many countries. It was to be hoped that this would be so co-ordinated and synchronised among the great industrial nations as to check the downward swing of the trade cycle.

It had been anticipated that until the end of the current year the manufacturer members of the Association would be almost entirely occupied in connection with Government requirements, but a short time ago, due to a change in international circumstances, the original programme was materially reduced and it was now reasonable to hope that at a very early date supplies of domestic and other refrigerators in ever-increasing quantities would become available for general use both at home and abroad. While for a time these would necessarily be generally produced on the lines of pre-war models, as early as was practicable customers would have available equipment incorporating all the benefits of manufacturers' wartime experience. But this depended upon an adequate supply of labour. He regretted to say that the position in this respect was still most unsatisfactory.

Mr. Batt then proposed the health of the guests, mentioning particularly the presence of Mr. G. Tomlinson, Minister of Works, Miss Caroline Haslett and Mr. W. Watlington. Mr. Tomlinson responded to the toast in his characteristic fashion.

Retailers' Conference

The third Annual Conference of the Council of Retail Distributors is to be held at Buxton on April 2nd and 3rd. Captain L. D. Gammans, M.P., the chairman, will preside.

Installations in Temporary Houses

Notes from Experience of Four Types

By P. Ridler

An interesting comparison may be drawn between the methods of wiring in use in pre-war permanent houses and in new temporary houses. The latter possibly reflect the mood of the wiring industry in aiming at simplicity in fittings, accessories and lay-out, rapidity in erection, usefulness to the occupier and a readiness to adopt different methods.

The complete electrical equipment of the temporary houses includes cooker and immersion heater with thermostatic controls, washboiler, kettle, iron, and provision for a refrigerator. This, with lighting, totals 13½ kW and probably represents the bare minimum that can be expected now in the small dwelling of any kind when gas is excluded.

The main control is similar to the splitter switch, combining main switch and distribution fuse board in one unit, and is situated in the kitchen, where it is fed by v.i.r. or p.v.c. mains from the service point, without the usual control adjacent to the meter.

It was found necessary in one type to strengthen a thin ply-wood back panel of the meter cupboard in order to fix the meter securely. In another type better means should be found for enclosing the service unit than by a screwed-up panel. Although the service fuse rarely requires attention it should not be permanently fastened up. In the type referred to a wooden panel is secured by several screws sunk into it, puttied and painted over. These have to be removed to gain access to the service.

Control Unit and Fuses

Circuits from the control are all labelled. This is of great assistance to the maintenance man but it loses most of its value when the control unit is mounted in the top of a cupboard and the label is on the inside of a hinged cover which drops only to horizontal. It will probably not be seen.

Single-pole fusing is standard. One result is that electricians and inspectors are finding it not so easy to isolate a faulty circuit. On the old double-pole board it was a simple matter to remove the fuse bridges on both poles to isolate circuits. With s.p. boards the return wires must be removed from their terminals and, although separate terminal holes are provided for each circuit, they are not always found in the same sequence as the fuse ways, and are therefore not easily identifiable.

Very little use is being made of two-way switches. Flex pendants are sometimes dispensed with in favour of batten lampholders or bakelite wall brackets. Cord-operated ceiling switches are used where the wall type would introduce shock risks. The lighting bracket in some bathrooms is rather closer to the bath than many inspectors care to approve, but it is unlikely to be seriously objected to. Wiremen find cause for complaint in insufficient wiring space behind switches, where they are fixed hard up against the wiring outlet without a block.

"Harness" Wiring

A wide variety of cable is being used, *e.g.* braided, stranded, v.i.r. or p.v.c., single and multi-cores, also short runs of steel conduit and of mineral-insulated cable. All except the last two kinds are, in British "pre-fabs," laid in the roof spaces and even dropped between partition walls without further protection—a radical departure from recognised pre-war practice. These cables are supplied cut to length and fastened together relative to their final positions. In this form, known as "harness," they are lifted bodily above the ceilings, allowing the switch drops to hang down between the partitions for connection into switches or socket outlets. Alternative methods are to secure them into grooves in the wooden wall posts or to insert them into vertical lengths of steel conduit. The latter arrive already attached to the wall frames. Being bound together every few inches it is quite impossible to withdraw a faulty cable. For instance, a broken conductor has necessitated extensive dismantling before it could be replaced.

A type from the United States avoids these possible troubles by providing cable channels near the ceiling which are afterwards covered with wood strip forming an edging around the wall panels. There are similar channels for the runs to switch positions and sockets, the latter, in these houses, being situated at a

convenient height on a chair rail in each room, a practice that will be welcomed.

Lengths of mineral-insulated cables arrive with the plumbers' units. They are already cut to length with their ends sealed. It has been found advisable to test all these cables before installing them to guard against the possibility of a length with faulty seal passing unnoticed until the completion of the job. Electricians should know the correct methods of handling and installing this cable.

Switchless sockets have protecting screens over the live parts actuated by the earth pin. The decorator's paint-spray gun can play havoc with these and it is worth while taking steps to prevent ingress of paint. Up to three 5-A socket-outlets are connected to a 3/·036 circuit from a 15-A fuse way. Flexibles of down to 40/·0076 may be used for appliances connected to these. This size is a wartime relaxation, although it is probably still larger than will be in common use.

A "luxury" feature to be found in the bathroom of the "pre-fab" is a towel rail heated by water circulating from a storage tank in circuit with the fire-back boiler. Tests have shown that when the immersion heater is the sole source of heat 6 to 7 kWh per day is needed to compensate for losses. A re-arrangement of the towel rail pipes and immersion heater would possibly reduce this.

The occupiers themselves are enthusiastic about the electrical amenities in the "pre-fabs" which will make a considerable contribution towards full scale electrification of small houses.

NEW BOOKS

The Cathode-ray Tube Handbook. By S. K. Lewer, B.Sc. Pp. 95; figs. 35. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 6s.

The author, who is the executive vice-president of the Incorporated Radio Society of Great Britain, has briefly set out the principles on which this oscillographic device is designed, constructed and operated.

The booklet is written in simple language without mathematics. The first two chapters deal with "picture drawing by electronics" and the movement of electrons and graphical representation. The third is constructional, followed by chapters on circuit arrangements, valve amplifiers and linear time-bases. In the sixth is set out a practical oscillograph circuit while the last chapter mentions some of the measurements for which the instrument is used in radio engineering.

No attempt is made to provide full constructional details, but some component values are added to the few circuit diagrams reproduced when they are considered likely to serve as useful guides in experimental work. A list of references and an index are included.—W.O.F.

Optical Instruments in Engineering. By S. H. Hemsley, B.Sc. (Hons.), M. Amer. I.E.E., A.M.I.E.E. Pp. 80; figs. 40. Paul Elek (Publishers), Ltd., Diamond House, 36, Hatton Garden, London, E.C.1. Price 7s. 6d.

This little book is intended to outline the construction and scope of some of the instruments now obtainable for workshop use. It describes the several ways in which different types function, without going into details, but general capabilities are indicated in order to suggest the manner in which particular instruments might be used in specific cases. Optical principles and the relationship between mechanical and optical measurement are dealt with in the first dozen pages; the author is equally brief in the other sections, respectively concerned with the instruments themselves, errors of alignment and inclination, magnification for fine measurement, optical interference and the electron-microscope, which is dealt with in two pages. An index is included.—W.O.F.

Handbook for Electric Welders. Pp. 185; figs. 90. Murex Welding Processes, Ltd., Waltham Cross, Herts. Price 5s.

A good deal of the purely elementary matter contained in previous editions of this leather bound handbook has been deleted, since it is now more readily obtainable in training establishments. Such instructions as are given in the latest edition are therefore special rather than general. Welding is dealt with as a whole; a bibliography has been provided for those seeking details. The first two chapters are concerned with the electric arc, electrodes and their uses. The next two deal with the practical aspects of welding mild steel and five classes of special materials. There follows a study of welds and weld metals while the last two chapters review the physical properties and testing of deposited metal as well as the strength of joints. There are five appendices of tabulated data, mainly relating to electrodes.—W.O.F.

A Cost-Finding Chart for Industry. By S. C. Roberts, F.C.W.A., M.I.I.A. Pp. 24 and two charts. Emmott & Co., Ltd., 31, King Street West, Manchester. Price 2s.

In this booklet job and process costing are briefly covered and the make-up of labour, material and overhead costs is explained to enable the chart to be understood and used. It is claimed that the system is applicable to any industry.

COMMERCE and INDUSTRY

Supply Men's Wages Claim. Machine Tool Motors.

Mr. Shinwell at E.D.A. Lunch

THE Minister of Fuel and Power, Mr. Emanuel Shinwell, is to be the principal guest at the annual luncheon of the British Electrical Development Association at the Connaught Rooms, London, on March 15th. As we have already reported, the annual general meeting will be held immediately after the luncheon.

Electricity Supply Workers' Wages

At a conference of the District Joint Industrial Councils for the Electricity Supply Industry last week in London, the employees' representatives put forward a request for an immediate substantial increase in wages. Dissatisfaction was expressed at the recent award of the Industrial Court giving the employees in the industry an increase of 1d. per hour in two steps and it was denied that the men were contented, as constantly stated by the employers. The trade union representatives were instructed to call for an early meeting with the employers' representatives.

Machine Tool Control Alterations

The Control of Machine Tools (Electrical Equipment) (No. 2) Order (S.R. & O. 1946, No. 207), which comes into force on February 25th, removes certain restrictions on the manufacture and supply of electrical equipment for machine tools and on the requirements which buyers of such equipment may impose. Article 2 of the original Order is not being revoked so as to retain the provision which affords protection to consumers when three-phase electric motors up to 5 HP are started direct to line and those up to 30 HP are of the squirrel-cage type in contravention of the varying electricity supply authorities' regulations. By this means a desirable degree of standardisation of machine tool electrical equipment has been effected and it is on this account, and in fairness to consumers who have installed such equipment, that the provision is being retained.

Contract Price Adjustment Formulæ

The British Electrical and Allied Manufacturers' Association informs us that the latest figures for its contract price adjustment formulæ are as follows:—Rate of pay for adult male labour at February 9th, 95s. (unchanged). Costs of material: the index figure for intermediate products last published by the Board of Trade on February 9th, is 189·5 and is the figure for the month of January (compared with 181·8 for December).

Industrial Statistics

The Royal Statistical Society has reconstituted its Industrial and Agricultural Research Section, whose activities were suspended during the war, in the form of a Research Section and an Industrial Applications Section. The latter has grown out of the successful activities of the informally constituted wartime Industrial Applications Group which provided a common meeting ground for statisticians and engineers. The Section is concerned with the application of statistical technique to industrial research, development, and manufacture, including inspection. It is organised in local groups, which may be formed wherever sufficient support is forthcoming. Groups have already been formed in Birmingham, London and Sheffield and one is in the process of formation in the North-East Coast area. Membership is open to all interested persons who are approved by the Section Committee. An annual subscription of 10s. is payable. Further information may be obtained from the Assistant Secretary, Royal Statistical Society, 4, Portugal Street, London, W.C.2. The hon. secretary of the Section is Mr. W. J. Jennett of the G.E.C. Research Laboratories.

New Scottish Factories

The *Board of Trade Journal* publishes a list of factory building schemes in Scotland approved up to January 1st this year. Among them are the following:—Dundee, 46,000 sq. ft., Bonar, Long & Co., Ltd. (transformers); Dundee, 50,000 sq. ft. extension, B.X. Plastics, Ltd. (plastic moulding powders); Hillington, 110,000 sq. ft. extension, L. Sterne & Co., Ltd. (refrigerating plant); Renfrew, 57,500 sq. ft. extension, Scottish Cables, Ltd. (electric cables).

N.P.L. Filmed

The High-Voltage Laboratory of the National Physical Laboratory was recently filmed for the New Pathé Pictorial. The film opens with a "shot" of a sphere gap and then two experimental officers are seen testing an insulator for the grid and "fireworks" are provided by a 500,000-V flashover.

Gas Turbine Explained

In a four-page supplement to the issue of February 21st, of our contemporary *Flight*, Mr. Geoffrey Smith, the managing editor, gives a lucid explanation of the gas turbine, with large seven-colour sectionalised drawings. In an estimate of the potentialities of jet propulsion the author holds that before the present year ends long and short range transocean air liners having air-conditioned cabins and propelled by gas turbines of 10,000 equivalent HP will be evolved. Copies of the supplement are available separately, price 6d. post free, from the Publisher, Dorset House, Stamford Street, S.E.1.

E.M.I. Plans

The directors of Electric & Musical Industries, Ltd., are converting what have been hitherto departments into subsidiary companies, each operating under an E.M.I. name. Each of these will have its own managing director and the whole will be co-ordinated under the direction of Sir Ernest Fisk as governing director. The new plan will not in any way affect the name, nature or methods of marketing the companies' products, but is purely an internal re-organisation providing for speedier and more efficient operation. E.M.I. is the controlling organisation for the Gramophone Company ("His

Master's Voice"), the Columbia Graphophone Co., and the Marconiphone and Parlophone Companies. This group maintains important electronic and television research and development laboratories in conjunction with a large manufacturing organisation at Hayes, Middlesex.

Reinstatement Ruling

An umpire under the Reinstatement in Civil Employment Act has ruled that the Act does not extend to employment outside the United Kingdom. This reverse decision of a special committee, on the appeal of the Colonial Office, that Mr. G. Lloyd Price, a former temporary electrical engineer with the Straits Settlements Public Works Department, should be given employment and compensation for any loss which he might suffer. Mr. Lloyd Price was in Singapore when it was captured but escaped to Australia and subsequently served in the Indian Army. After being in hospital for a time he was appointed as an electrical engineer in Malaya but in the meantime had applied for reinstatement under the Act.

Flameproof Apparatus

The customary quarterly list of electrical equipment, mining and industrial, for which certificates of flameproof enclosure were issued during the three months ended December, 1945, is now available. At the request of the B.E.A.M.A. a few copies may be obtained from the Library, Ministry of Fuel and Power (Coal Division), King's Buildings, Dean Stanley Street, London, S.W.1.

Electrolux Refrigerators and Cleaners

At present fully engaged on Government contracts and further faced by a serious shortage of labour, Electrolux, Ltd., does not expect to have adequate supplies of refrigerators available to the trade generally under twelve months. In addition to built-in models, cabinet-type models will be produced in the following capacities: 2·2 cu. ft., 3·8 cu. ft., 5·5 cu. ft., and 7·5 cu. ft. The prices of models for electric, gas or paraffin operation will range from £39 10s. to £83 10s. Two models of Electrolux suction cleaners will be available in small quantities in March.

Explosion at Substation

A charge engineer and his assistant were killed last week when an explosion occurred at a substation of the London Passenger Transport Board at Lewisham. The men were working on the switchgear when a short circuit set fire to the oil and the container burst throwing blazing oil over the men.

False Pretences Charge

A fine of £500 was imposed at Leamington recently on William Parsons, sole director of Parsons & Hodges, electrical engineers, Leamington, for obtaining money from the Ministry of Works by false pretences. There were six summonses involving £23, but Mr. R. J. Jones, prosecuting, stated that examination of the firm's books showed that a total of £549 was concerned. The firm had carried out certain contracts for the Ministry, under which they were to supply labour, and were to have repaid to them the actual amounts expended in wages plus 15 per cent. Apprentices had been employed, and, he alleged, the firm had received more than they paid out.

Mr. Colin Coley, for the defence, said the point for the Bench to consider was whether, in charging 1s. an hour for apprentices for which defendant claimed official sanction, Parsons did so with intent to defraud, or considered he was justified in charging it.

The Bench found all six charges proved.

Bakelite Extensions

During the war, Bakelite, Ltd., embarked on the production of polyvinyl chloride extrusion compounds for cable covering, etc., to meet the failure of natural rubber supplies. The production of polyvinyl resins and compounds is now to be a permanent feature of the company's activities and new buildings for this purpose are being erected on a 38-acre site, at Aycliffe, near Darlington; it is anticipated that a temporary production unit will be in operation by April of this year. The Aycliffe factory will make polyvinyl chloride extrusion compounds, urea compounds and also some grades of phenolic materials, representing overflow production from the Tyseley Works. Ultimately polyvinyl chloride materials and sheet will be produced.

Bell Transformers

A revised version of BS. 832, dealing with bell-ringing transformers, but excluding those used in mines, is concerned with the type having separate input and output windings for connection to low voltage circuits. General requirements have not been changed, but additions have been made to cover a less elaborate model intended to furnish only one output voltage. Copies are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, for 2s. each.

New B.V.C. Subsidiary

B.V.C. Industrial Constructions, Ltd., a new subsidiary of the British Vacuum Cleaner & Engineering Co., Ltd., is now operating from Africa House, Kingsway, London, W.C.2. It will be concerned with the design, construction and sale of pneumatic and mechanical handling plants, heating and ventilating installations, etc. The following directors have been appointed to the board of the new company:—Mr. J. J. Hambidge (chairman), Mr. Seymour Booth, Mr. D. Watkins, Mr. A. T. Shaw and Mr. A. W. Daniels, M.I.Mech.E. (the first three are also directors of the parent company).

Scholarships and Bursaries

Mr. A. L. Johnson (Rd. Johnson, Clapham & Morris, Ltd.), the chairman of the Educational Committee of the Worshipful Company of Tin Plate Workers, *alias* Wire Workers of the City of London, has sent us copies of forms of application (with explanatory notes) for the Company's travelling scholarships and bursaries. These have been sent to certain trade associations and trade unions connected with their craft. There are six scholarships valued at £50 each enabling the holders to make tours of at least four or five weeks' duration for the purpose of studying their trade. The value of the two bursaries is £150 per annum for three years and they may be

held at any university in Great Britain and Northern Ireland granting degrees. Mr. Johnson's address is Haywood House, Stewkley, Leighton Buzzard.

"Unfair Competition" Complaint at Dover

At a recent meeting of the Dover Chamber of Commerce a deputation was appointed to meet the Town Council on the question of competition by the Council's Electricity Department. Mr. E. Longley, moving a resolution of protest, said that the Council had decided to sell apparatus and carry out contracting, claiming that electrical contractors could not cope with the amount of work to be done. He said that the contractors had been the electricity undertaking's salesmen in the past and had canvassed the outlying areas and many roads and streets. Now that the spadework had been done, the Council was to compete with the contractors. At a meeting of the Electricity Committee the previous day there had been a long discussion on the same matter, some opposition being expressed to the decision to charge contractors 10 per cent. above cost price for goods supplied. It was explained that this was to meet administrative costs.

Police Radio

Mobile radio telephony apparatus developed by the General Electric Co., Ltd., has been adopted by the police at forty important centres in England, involving more than 500 police cars, as well as by the National Fire Service, which has twenty-seven similar schemes, the largest of which, in London, includes a river service. The equipment is designed for continuous operation on any fixed frequency from 30 to 131 Mc/s (10·2·29 metres).

International Lighting Exhibition

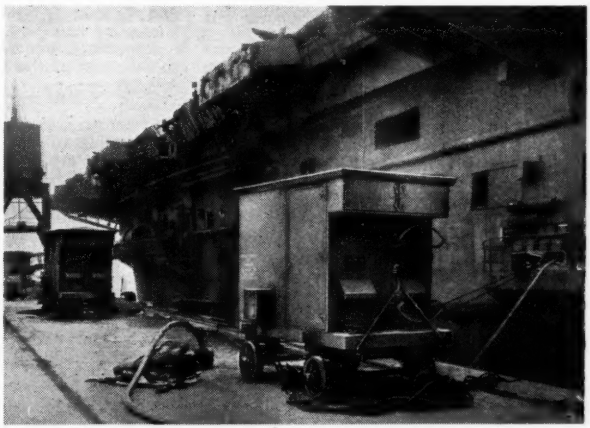
Under the auspices of the Industrial and Commercial Lighting Equipment Section of the National Electrical Manufacturers' Association an International Lighting Exposition is being held in Chicago from April 25th to 30th. There are to be over sixty exhibitors and conferences are being arranged on new lighting trends and methods, lighting sales for electrical contractors, industrial lighting service and sales training, and lighting applications.

Fatal Shock from Aerial

The need for wireless installations to be serviced by experienced people was emphasised by the Belfast city coroner at an inquest on Mrs. Victoria May Houston (43), who received a fatal shock when she came into contact with an aerial which had fallen in her yard during a storm. An employee of the corporation electricity department said that when the set was switched on the aerial and earth terminals became alive. There was no earth wire attached to the receiver and therefore no means of blowing the fuses. Anyone touching the aerial would receive the full shock from the mains. Questioned by the coroner, Mr. Houston, husband of deceased, said that the man who repaired his set told him there was no need for an earth wire. A verdict of "Accidental death" was recorded.

Rectifiers for Dockyards

Many Hewittic mercury-arc rectifier equipments were supplied during the war for dockyard services, such as the operation of cranes and charging batteries for electric trucks. The accompanying illustration shows mobile equipments in service at an Admiralty dockyard, providing DC for auxiliary services on a naval vessel, the ship's own auxiliary DC supply being shut down while she is in port.



Hewittic mercury-arc rectifiers in use at an Admiralty dockyard

Canadian Plant Contract

The Edmonton (Alberta) City Council has approved the purchase of a 30,000-kW turbo-generator from C. A. Parsons & Co., Ltd., at a cost of $679,738. The set is to be delivered and installed in 1948. A lower tender was received but the Council was advised that the Parsons equipment would have lower operating costs.

Light Measurement

At a meeting of the Birmingham Centre of the Illuminating Engineering Society on February 1st, Dr. J. W. T. Walsh, director of the Illumination Research Department, N.P.L. lectured on "The Measurement of Light." Dr. Walsh said that the proposed new method of standardisation of candle power, which it was

hoped would become international very soon, was by comparison with the brightness of the radiations from molten platinum taken at its solidification point. He explained the apparatus developed to produce these radiations. Subsequently the lecturer dealt with light sensitive cells, explaining how they were affected by temperatures, coloured light, etc.

Unauthorised Connection to Mains

A fine of £2 was imposed recently on Cecil George Pearce, an electrician, who was charged with making an unauthorised connection to the supply mains of the High Wycombe Borough Council. It was stated in evidence that Pearce had wired a bungalow and in order to test the installation had connected it up to the mains; there was no question of any attempt to obtain a free supply of electricity. As a result of his action an adjacent bungalow was deprived of light for a night and an electric clock was damaged.

Business Training for Technicians

In a letter to *The Times*, Mr. F. C. Hooper, Director of Business Training, Ministry of Labour and National Service shows how necessary it is for a technician destined for business to be trained in the basic principles of business management. Personality, technical knowledge and even experience are not enough to produce a business leader. Mr. Hooper says that the Ministry's business training scheme, and in particular the short general course in business administration sets out to accomplish this. It is designed initially for young men and women released from war service, but Mr. Hooper hopes that it will continue when their needs have been met.

Planning for London

The annual general meeting of the London Branch of the Electrical Association for Women on February 14th, was followed by a talk on "The County of London Plan" by Mr. E. L. Reiss, vice-chairman of the Town and Country Planning Association; Lady Railing was in the chair. The general principles of both the County of London and the Greater London plans were considered, emphasis being laid on the need to meet individual requirements and also to provide social integration within a comprehensive framework.

No Need for Deputy at Bury?

By twenty-six votes to one Bury Town Council has referred back a minute of the Electricity Committee proposing that applications should be invited for the position of deputy electrical engineer. One councillor said that there was no necessity whatever for additional managerial assistance. He could not understand why any undertaking sub-divided on clearly defined lines, such as the electricity undertaking, should need some one to interpose between the responsible heads of each section and the engineer and manager.

Trade Publications

Sunvic Controls, Ltd., Stanhope House, Kean Street, Aldwych, London, W.C.2. Illustrated leaflet (EA.11 (a)) describing with the aid of circuit diagram and performance graph a proportioning head for adjusting the power input to a toluene regulator for thermostatic control.

British Thomson-Houston Co., Ltd., Bridle Path, Watford Junction, Herts.—Two illustrated bulletins: (No. 7) dealing with the planned maintenance of industrial lighting installations and detrimental factors encountered in factories; and (No.8) describing the development of lighting fittings, and stating the main factors of optical design and equipment necessary to test the performance of component parts.

International Time Recording Co., Ltd., Beavor Lane, London, W.6.—Illustrated leaflet describing the "Duosight," which renders both sides of a wages card or ledger sheet visible simultaneously without turning over the document.

Smith's English Clocks, Ltd., Cricklewood, London, N.W.2.—Illustrated leaflet containing detailed instructions for cleaning and oiling "Sectric" mains-driven clocks.

Applicants for copies of these publications should write on their firms' business notepaper.

"Britmac" Accessories

C. H. Parsons, Ltd., have set up a separate organisation for the sales and distribution of their "Britmac" electrical accessories—the Britmac Electrical Co., Ltd. There is no change in the company's sales policy of distribution through recognised electrical wholesalers.

Trade Announcements

The Birmingham depot of Simpson, Baker & Co., Ltd., has been moved to more commodious premises at 13 & 15, Anderton Street, Birmingham, 1 (telephone: Cen. 7606/7).

The Transformer & Electrical Co., Ltd., have moved from South Woodford to Eastern Works, Eastern Road, Walthamstow, London, E.17 (telephone, Keystone 5031-2).

The Hoffmann Manufacturing Co., Ltd., is opening an additional branch office at 5, Municipal Buildings, Charles Street, Leicester (telephone No. 5181).

As from March 1st, the London office of the Spencer Wire Co., Ltd., will be at 53, Victoria Street, London, S.W.1. The telephone nos., Abbey 2562/3, are unchanged.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following :—

Domestic iron "E.T.I."

Centrifugal switches for AC fractional-HP motors.

"Delarmet" self-aligning bearing.

Inspection Equipment

Comprehensive Display at Newcastle

REFERENCE to the work of British industry in manufacturing during the war inspection equipment which had previously been imported, was made by Sir Charles Darwin, Director of the National Physical Laboratory in opening a 10-day exhibition of scientific and engineering inspection equipment at Newcastle-on-Tyne on February 12th. The exhibition was organised by the National Trades Technical Societies. The Lord Mayor of Newcastle (Ald. J. A. Clydesdale) also spoke at the opening ceremony.

Sir Charles Darwin dealt with the value of inspection equipment, especially during the war. All the exhibits were applicable to peaceful purposes. He declared that the exhibition was exclusively British. In the past, Britain had imported a great part of its equipment, such as gauges, etc., from Germany, America, Sweden and Switzerland. These supplies were cut off during the war and Britain had had to make its own equipment. There was now in this country as fine equipment and inspection gear as could be found in any part of the world.

Mr. D. M. Slorach, M.I.E.I., hon. director of the exhibition, stated in an interview that the Societies had been asked to hold similar exhibitions in London and on the Continent.

Electrical Exhibits

The exhibition (which closes to-day, Friday) comprises forty-one stands, and among the exhibitors are the following:—

Salford Electrical Instruments, Ltd., show an enamelled wire pinhole tester, a layer thickness meter, a magnetic sorting bridge, a miniature oscilloscope, a radio-frequency crack detector, sapphires, a vibration analyser, and measuring instruments.

Marconi Instruments, Ltd., exhibit pH meters, indicators and recorders, moisture-in-grain meters and moisture-in-timber meters and recorders, an electrostatic viewing unit, a circuit magnification meter, beat frequency oscillator, a signal generator, a wave analyser, a chronoscope, a valve voltmeter, a thickness meter, an X-ray dosemeter, and short-wave diathermy apparatus.

The Foster Instrument Co., Ltd., displays the Foster "Introscope" and pyrometers. W. & T. Avery, Ltd.'s exhibit includes a power-operated Brinell hardness testing machine, a dynamic balancing machine, and a direct reading hardness testing machine.

Clarke, Chapman & Co.'s beam dispersion projector exemplifies the application of electrolytically brightened aluminium to reflectors for use in mine lighting.

The Labgear display comprises a comparator, a hand-comparator, a fault tracer, a sub-standard variable capacitator, "Lockstrip," shielded test prods, a resistance unit, a cylindrical transformer for medical apparatus, a phase indicator and a valve voltmeter. Dawe Instruments, Ltd., show resistance boxes, condenser boxes, an air condenser, a wide range oscillator, an a.f. microvolter, valve voltmeter, the "Stroboflash" and "Stroboflood," and a moisture-in-timber meter.

The exhibits of the Sigma Instrument Co., Ltd., include a signal comparator, an audible comparator, an automatic sorting machine, a small hand-operated multi-inspection machine, and diameter measuring machines.

Sunvic Controls, Ltd., display examples of their vacuum switches bi-metal relays, bi-metal thermostats, glass-sealed thermostats, electronic relays, a proportioning toluene regulator, a proportioning resistance thermometer controller, fire detectors, an energy regulator, "Simmerstats" and water heater thermostats.

The Metropolitan-Vickers Electrical Co., Ltd., have on view a magnetic crack detector, fluorescent crack detection equipment, a magnetic sorter, a lamination detector, and a demagnetising coil. Attention is also drawn to the electron microscope now being manufactured in the company's Research Department.

Among exhibits by Taylor, Taylor & Hobson, Ltd., are "Talymin" electric gauges. Scophony, Ltd., have an electronic stroboscope, and a dynamic balancing machine. A. Reyrolle & Co., Ltd., exhibit examples of X-ray equipment for the inspection of insulators, insulator power-factor testing equipment, and pressure recorders for use in switchgear testing.

Wild-Barfield Electric Furnaces, Ltd., show a forced air circulation furnace, the "E.S.B. minor" electrode salt bath, "Wild-Barfield-Resilia" pyrometer testing equipment, a laboratory furnace, Ferranti-Wild-Barfield h.f. heating equipment, viewers of various types, a projection-angle "Dekkor," a "Spekker" steeloscope and photoelectric absorptiometer.

Associated Iliffe Press, Ltd., display a range of their technical and trade journals, including *Aircraft Production*, *Automobile Engineer*, *British Engineering Export Journal*, *British Plastics*, *Wireless World*, *Iron and Steel*, *Metal Industry* and *Electrical Review*.

City and Guilds Institute

THE report of the City and Guilds of London Institute for 1944 shows that in the Department of Technology examinations the number of candidates increased by 4,240 over the 1943 figure and totalled 25,172. Transmission and lines was the only subject in which the number of examinees fell and there were large increases in the number of candidates sitting for the examinations in technical electricity, radio communication and telegraphy.

PARLIAMENTARY NEWS

By Our Special Reporter

Standardisation of Plugs

IN the House of Commons on February 11th, Mr. Bossom asked the Minister of Supply and of Aircraft Production whether he would take action to standardise all electric light and power plugs throughout the country.

Mr. Wilmot said that recommended standards had been laid down, but their adoption would have to be gradual, in view of the manufacturing and servicing problems involved.

Trafford Park Factories

Sir Stafford Cripps, President of the Board of Trade, informed Mr. Austin that four of the Government factories in the Trafford Park area had been allocated for peacetime production. The Metropolitan-Vickers factory in Mosley Road would continue to be occupied by the company, which was rapidly turning over to peacetime production of heavy electrical plant.

Government's Exhibition Policy

Sir Stafford Cripps informed Mr. Hale that it was proposed to hold the next British Industries Fair in the first half of 1947 and as usual a space would be reserved for Empire exhibits. A committee under the chairmanship of Lord Ramsden had just reported on the policy and plans for future exhibitions and fairs; the report was now being considered. Any decision as to holding a special Empire Trade Fair would depend on the outcome of their considerations.

Imports from America

The Chancellor of the Exchequer on February 12th gave details of imports from the United States in 1945. Included in these were radio apparatus, £9,121,000, of which only £647,000 was imported in the last quarter of the year. Other electrical goods and apparatus were valued at £3,835,000 of which £136,000 was imported in the last quarter.

Wiring in Temporary Houses

On February 14th Mr. S. Marshall asked the Minister of Works if he was aware that the methods adopted for electrical wiring in prefabricated houses involved almost a monopoly on the part of a few firms supplying the harnesses and accessories, and that the electrical contracting industry was being called upon to provide only the site labour, which was almost negligible; and in view of the limited amount of electrical work available, if he would follow the orthodox methods of house-wiring which compared favourably in cost and quality.

Mr. Tomlinson replied that the contracts for the supply of harness and accessories for the temporary prefabricated houses were placed with a range of manufacturers and did not involve any monopoly. The method adopted for temporary houses was designed to make the best use of factory labour and to leave the labour available for site work as free as possible for other new building.

Voltage Standardisation

Comparative Costs of Conversion

LAST week particulars were given of the proposal of the Ministry of Fuel and Power to standardise low-voltage supplies at 240 V. The following table compares the estimated gross and net costs of raising the various existing voltages to 230 and to 240 V, on the assumptions previously quoted. The net costs of £26·43 million for the 230-V scheme and £18·49 million for the 240-V scheme are obtained by deducting the increase or decrease in value of the low-voltage mains from the cost of standardising.

TABLE COMPARING GROSS AND NET COSTS OF STANDARDISING (£ MILLION)

Voltage	Consumers 1943/44 (thousands)	Value of mains	At 230 Volts			At 240 Volts		
			Cost of standardising	Inc. or dec. in mains capacity, per cent.	Inc. or dec. in value of mains	Cost of standardising	Inc. or dec. in mains capacity, per cent.	Inc. or dec. in value of mains
250	900	7·62	9·00	−15	−0·456	0·22	−8	−0·244
240	1,270	10·76	0·32	−8	−0·344		(standard)	
230	5,602	47·47		(standard)		1·40	+9	+1·708
220	261	2·13	0·06	+9	+0·076	2·61	+19	+0·160
210	284	2·40	2·84	+20	+0·192	2·84	+31	+0·296
205	117	0·99	1·17	+26	+0·104	1·17	+37	+0·144
200	1,386	12·20	14·46	+32	+1·848	14·46	+44	+2·144
Other	60							
Totals	9,880	83·57	27·85	—	+1·420	22·70	—	+4·208

ELECTRICITY SUPPLY

Llangollen Purchase Decision. Floods in Midlands.

Cardiff.—NEW FACTORY.—The Electricity Committee is in negotiation with McLellan & Partners, consulting engineers to Guest, Keen & Nettlefolds, Ltd., regarding a supply of electricity to a new factory being erected near the airport.

Chesterfield.—" ALL-ELECTRIC " BUNGALOWS.—A supply is to be provided by the Electricity Committee to 30 all-electric temporary bungalows to be erected at West Hill Lane, Grassmoor. The tariff will be a standing charge of 7d. per week per bungalow plus ½d. per kWh.

BRICKWORKS SUPPLY.—The Electricity Committee has agreed to provide an additional supply to the Chesterfield Brick Co. at Wasp Nest brickworks at a cost of £2,245.

Douglas (I.O.M.).—SUPPLY TO HOUSES.—The Electricity Committee is to provide a supply to 118 houses at Spring Valley, at a cost of £2,500.

Edinburgh.—UNSATISFACTORY INSTALLATION WORK.—The Electricity Department states that a considerable amount of work is being done in the city in connection with domestic electrical installations and extensions that is unsatisfactory and in many cases dangerous. The attention of the public is directed to the necessity for ensuring that installations are of sound construction and all persons contemplating such work are urged to ensure that the work is carried out only by skilled persons.

Hastings.—PURCHASE OF " PLUTO " SWITCH.—A special 11-kV switch installed in the Fairlight Place substation for the supply from Broomgrove for operating the " Pluto " oil pipe line has been purchased by the Electricity Department from the Ministry of Supply for £300.

Hoddesdon.—PROPOSED NEW POWER STATION.—The North Metropolitan Power Station Co., Ltd., gives notice that it has applied to the Electricity Commissioners for consent to the erection of a power station at Hoddesdon, Hertfordshire. Plans and specifications may be inspected at the offices of the Hoddesdon U.D.C., or at the company's office, Northmet House, Southgate, N.14, and objections may be entered by letter addressed to the Electricity Commissioners (with a copy to the company) within thirty days of February 14th.

Hull.—RESULT OF REFERENDUM.—Recently the Housing Committee instructed the city treasurer to take a referendum of a proportion of waiting applicants for houses to ascertain whether they preferred electricity or gas for cookers and washboilers. Last week it was reported that 1,060 circulars had been sent out and of these 891, or 85 per cent., were returned. The number preferring electricity was 656, or 73·6 per cent.; gas, 163, 18·3 per cent.; and nine expressed no preference. Sixty-three papers, or 7 per cent., were either unsigned or spoiled.

Leicestershire.—SUPPLY TO SMALLHOLDINGS.—The County Council's Agricultural Committee has granted wayleaves to the Leicestershire & Warwickshire Electric Power Co. in connection with the supply of electricity to smallholdings at Bostock, Mowsley and Stoney Stanton. The Committee has declined to entertain a scheme submitted by the company for supplying holdings at Gilmorton and Misterton at a cost of £25 a holding for five years. The tenants are to be informed that this action is taken in the interests of the county ratepayers, and to offer them assistance in any endeavour to get more favourable terms from the company.

Llangollen.—EXERCISE OF PURCHASE OPTION.—The Urban District Council has decided to give two years' notice to the Llangollen and District Electric Light & Power Co., Ltd., of the Council's intention to exercise its option to purchase the undertaking. The Council had approached the Electricity Commissioners seeking sanction to borrow money to purchase the undertaking, and received a reply that in view of the Government's declared policy of nationalisation any changes could not be authorised at this stage. The Council, however, decided to inform the company that it contemplated purchasing the undertaking on April 7th, 1948.

Midlands.—FLOOD DAMAGE.—During the recent floods electricity supplies were seriously affected in a number of areas. The worst incident was experienced at the Stourport power station of the Shropshire, Worcestershire & Staffordshire Electric Power Co., where, through the overflowing of the River Severn, the auxiliary engine room was flooded to a depth of 3 ft. and the station was brought to a standstill. A limited supply was maintained from other sources, but many factories were without electricity and had to close down.

At Nottingham flood waters from the Trent penetrated the site of the extensions at the North Wilford power station and owing to the pressure of water a wall of the existing station showed signs of cracking. Three pumps were in operation almost continuously from February 9th to 11th and gradually the pressure on the wall was eased.

Morecambe.—NEW FEEDER.—The laying of a feeder to Overton at an estimated cost of £6,257 has been approved by the Council. The object is to improve supply in the Oxcliffe Road section, and to make electricity available at Heaton-with-Oxcliffe.

Scarborough.—PRICE INCREASE.—Sanction has been obtained to the proposed increase to 0·6d. per kWh in tariffs where the existing rate is 0·5d. All tariffs, including those where the rate is increased, are to be subject to a further surcharge of 2½ per cent.

Swindon. — ELECTRICAL EQUIPMENT FOR HOUSES.—As the Ministry of Works has declined to assist in the provision of cookers and washboilers for the " Howard " houses, the Corporation Housing Committee has arranged for the Electricity Department to provide 50 electric cookers and washboilers at an estimated cost of £1,500.

CONTRIBUTION TO RATES.—Of the £28,747 surplus on the year's working the Electricity Committee recommends that £13,500 shall be allocated to rate relief.

Torquay.—ELECTRICITY FOR ESTATES.—The Electricity Committee is to provide a supply to four housing estates at a cost of £7,950.

Watford.—CAPITAL EXPENDITURE.—The Electricity Committee has approved a capital estimate of £281,600 for the next three years.

North West Midlands.—INCREASED BORROWING POWERS.—The North West Midlands Joint Electricity Authority Order Confirmation Bill now before Parliament confirms a Provisional Order made by the Electricity Commissioners increasing the Authority's borrowing powers from £5,000,000 to £8,000,000.

Wolverhampton.—ELECTRICITY PROFITS TO AID RATES.—It is proposed by the Electricity Committee that the profit of the Electricity Department for the current year to an amount not exceeding 1½ per cent. of the outstanding loan debt shall be transferred in aid of the rates.

Overseas

Brazil.—NEW POWER STATIONS.—Three large central electric power stations for industrial development are to be erected in the State of Rio Grande do Sul. The plan will involve an expenditure of about 220 million crs.—*Reuter's Trade Service.*

Canada.—BRITISH COLUMBIAN SCHEME.—An immediate start on the development of Campbell River in the northern section of Vancouver Island has now been authorised by the British Columbia Government. Initially the B.C. Power Commission plans to construct a 50,000-HP hydro-electric plant.

Eire.—STREET LIGHTING IN DUBLIN.—At a meeting of the Streets Section of the Dublin City Council the city engineer stated that to convert all the gas lamps to electricity would cost £80,000. Since 1942 a total of 750 lamps had been converted.

TRANSPORT

Austria.—ELECTRIFICATION OF RAILWAYS.—*Reuter* reports that the whole railway system is to be electrified to save coal and utilise Austria's water power to the full. Herr Ernst Kaan, Director General of the Austrian State Railways, said that work would begin as soon as materials and labour were available. The conversion is expected to take twelve years and to cost 600,000,000 schillings. Reconstruction of the railway system, including the rebuilding of bridges blown up during the war is estimated to cost 1,000,000,000 schillings.

Bradford.—CONVERSION OF TRAM ROUTE.—The Transport Committee recommends the conversion of the Bradford Moor tram route to trolley-bus operation at a cost of £50,500.

India.—RAILWAY ELECTRIFICATION PLAN.—A plan for the electrification of the railway lines in the neighbourhood of the coalfields of Bengal and Bihar is being put forward by Sir Padamji P. Ginwala. The main lines running through the district are those of the East Indian and Bengal Nagpur Railways which, says Sir Padamji, would lend themselves to immediate electrification.—*Reuter's Trade Service.*

London.—VICTORIA STATION FIRE.—All the electric train services in and out of Victoria Station were stopped for some hours last Saturday as the result of a fire which damaged the traction cables and put the railway telephones out of action. The fire broke out at 5.50 p.m. when, according to an eye-witness, there was a blinding flash in the station roof and all the lights went out. Blazing embers from the roof set an empty train alight. In about three hours the fire was well under control and by 9.50 p.m. the power supply was restored to all lines.

New Zealand.—TROLLEY-BUS CONTRACT.—The *New Zealand Electrical Journal* reports that a contract for ten trolley-bus chassis for the Wellington City Council and four for New Plymouth has been placed with Dominion Motors, Ltd., as agents for Crossley Motors, Ltd.

United States.—NEW P.C.C. CAR.—The latest model P.C.C. (Presidents' Conference Committee) street car built by the St. Louis Car Co. uses no compressed air; the brakes, windscreen wipers, sanders, etc., are all operated electrically. Dynamic braking reduces the vehicle's speed to 1 m.p.h. instead of 4 m.p.h., an improved method of cushioning the shutting off of power prevents jerking and a new speed governing relay limits the maximum speed under any condition. A change in the motor control permits the acceleration rate to be carried to a higher speed.

Supplies for South Africa

OUR South African Correspondent reports that it was stated recently in Johannesburg that supplies of electrical apparatus imported into South Africa from Great Britain will not be sufficient to keep pace with the growing home and export demand for a very long time to come.

There is a definite preference in South Africa for many types of British electrical goods and there is also a readiness to exercise a certain degree of patience in awaiting British supplies, but in some cases the urgency of the demand makes it imperative to seek other sources of supply, Sweden and the United States prominent among them.

The importers of electrical goods are reminding customers that British electrical equipment manufacturers are faced with many problems in reconverting their industry from war to peace, and they believe that many high-priority Government contracts may remain in force until the end of 1946, so that there will not be as much manufacturing capacity as might be desired for export production. It is also said that the industry is faced with labour shortages, not only in its own factories but also in such supplying industries as castings and refractories. These factors are said to make it impossible to assess selling prices for some time to come, nor is it expected that the products will be of post-war design for a considerable period.

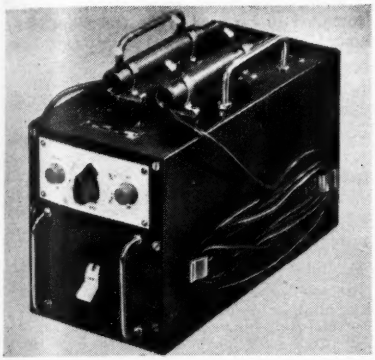
Apart from refrigerators and a few other items, Great Britain has always been far and away South Africa's largest supplier of small electrical appliances, materials and fittings, and large quantities of British heavy plant have also been imported. The last year for which complete returns are available is 1938, and in that year the Union purchased some £2,500,000 of small electrical needs, and Great Britain supplied such goods to a value of about £2,000,000. About 12 per cent. of the total supplies of such items came from the United States and about 6 per cent. from Germany.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Flash Tester

A PORTABLE instrument for flash testing insulation is announced by GRESHAM TRANSFORMERS, LTD., Twickenham Road, Hanworth, Middlesex. It is claimed to avoid any danger to the user and the risk of maintaining an arc that might burn beyond repair the sample being tested.



Portable insulation flash tester

Two single-phase transformers are used; the first is auto-wound with primary and secondary both tapped for connection to the second, which furnishes an output of 250 VA at from 500 to 2,500 V selected by a six-way internal switch. Protruding from the centre of the panel is the reclosing trigger of a built-in magnetic circuit-breaker, double pole, with copper-to-copper contacts, arc shields and adjustable overload setting, which interrupts the mains input (also extinguishing a pilot lamp) as soon as the insulation being tested breaks down.

Blue and red pilot lamps respectively indicate when the mains input and high voltage output circuits are "alive"; their filaments are preserved by operation at voltages below the normal rating. The applicator electrodes are shrouded with sliding sleeves for safety while " Durawire " is used internally and the mains connector has a third core for earthing the set. The sheet steel case, with collapsible handle, is 16 in. long, 8 in. wide and 10 in. high, weighing 58 lb.

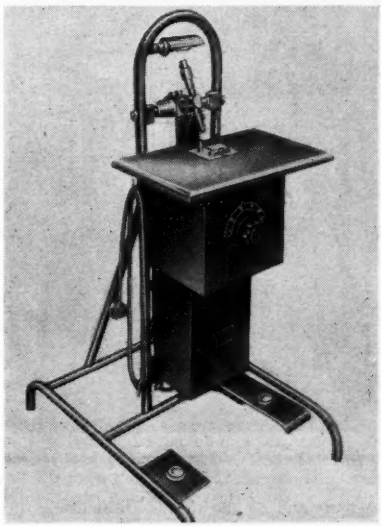
Small-part Welder

A small machine has been designed to enable manufacturers to weld (either spot or butt) as well as braze or solder small articles with accuracy and definite comfort of the operator. As there is no obstacle near the electrodes the machine is capable of dealing with large frames as well as tiny pressings and it is specially useful for brazing or soldering small parts on to jewellery, because the operator can rest comfortably on the table to assemble the minute parts to be joined.

The machine is constructed from light tubular parts weighing about one cwt., fitted with an inspection lamp and suitable for connecting to any 220 to 250-V AC circuit. It has a 2-kVA transformer with six heat tappings working in conjunction with a condenser-discharge timer ranging from 1/10th of a second to 3 seconds; when longer time is required for soldering or brazing the timer can be switched out for manual operation.

There are two treadles each with a contact switch in the centre operated by the tip of the toe. The right-hand treadle operates the spot welding arm, but the current will only pass when the contact switch is depressed; this enables the work to be correctly aligned before the actual weld takes place. The pressure between the electrodes is adjustable by a compression spring at the back of the machine. Both top and bottom electrodes can be water-cooled if desired. Almost any shape of tip can be fitted into either top or bottom electrode.

The left-hand treadle operates the butt welding equipment for wire up to $\frac{1}{8}$ in. diameter



New welding, brazing and soldering machine

on mass production. Special jaws can be fitted to suit all types of butt work and they can be water-cooled if desired. The timing and heat settings are adjusted to suit the particular gauge of wire or work, the upset being then operated by hand pressure.

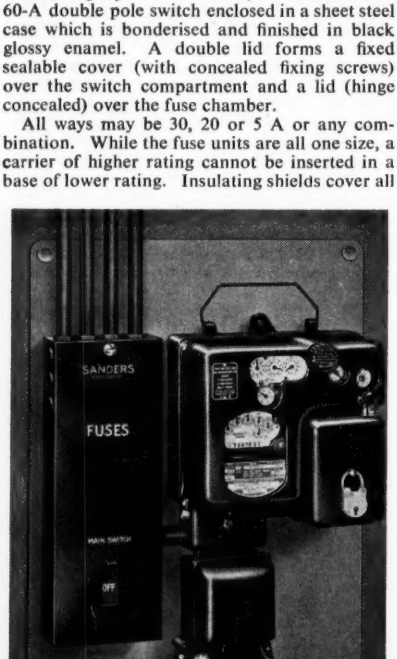
For soldering and brazing special electrodes can be supplied with tips made from a high electrical resistance material so as to generate sufficient heat instantaneously.

Technical information about the performance of this machine can be obtained from BUCK & HICKMAN, LTD., Whitechapel Road, London, E.1.

House-service Unit

A consumer's house-service distribution unit which is announced as in full production by W. SANDERS & CO., LTD., Falcon Works, Wednesbury, Staffs., consists of a six-way fuse board, single pole and neutral, combined with a 60-A double pole switch enclosed in a sheet steel case which is bonderised and finished in black glossy enamel. A double lid forms a fixed sealable cover (with concealed fixing screws) over the switch compartment and a lid (hinge concealed) over the fuse chamber.

All ways may be 30, 20 or 5 A or any combination. While the fuse units are all one size, a carrier of higher rating cannot be inserted in a base of lower rating. Insulating shields cover all



House-service unit (left) beside meter with service cut-out below

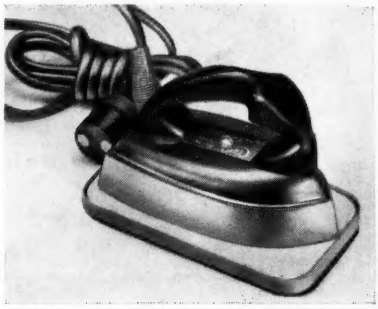
live parts and on the shields are indicated (in colours varying with the amperage) the capacity of the fuse and the circuit controlled.

Fuse carriers are of the rewireable pattern. The neutral block is provided with six outgoing terminals.

The switch, which is an entirely new Sanders product, is of the toggle type having arc-damping ceramic shields and providing definite isolation. The large indicator clearly shows from any angle whether the switch is in the "on" or "off" position.

Lightweight Iron

A clothes iron which weighs about 2 lb. and is intended to be used while travelling is announced by CLAYTON LEWIS & MILLER, LTD.,



Travelling iron on asbestos covered stand

Bridge Street, Staines, Middlesex. It is marketed under the trade name of "Clem," and has a chrome-plated sole and pastel shade anodised aluminium cover, the handle being of moulded bakelite.

Emergency Lighting Equipment

A new self-contained cubicle-type of emergency lighting equipment produced by BRITANNIA BATTERIES, LTD., 49, Victoria Street, London, S.W.1, contains an "Alklum" steel alkaline battery mounted on a draw-out truck which enables the battery to be inspected and maintained with the same freedom as if it were installed on a separate battery stand. Flexible cable connects the battery to the rectifier section inside the cubicle and sliding locks, operating on the side of the truck, prevent excessive withdrawal and possible interference with the battery connections.

It is pointed out by the makers that this totally enclosed design not only keeps the entire equipment free from dust and dirt, but, as it can be locked, is proof against unauthorised interference.

The contactor type of equipment—as supplied for cinema use—includes a test button in the AC feed to the main lighting contactor, enabling the user to carry out the regular routine tests for the whole emergency lighting gear, and a foolproof system of indication is supplied in the form of coloured lights.

Trade with Eire

United Kingdom's Position

A REVIEW of commercial conditions in Eire just published by the Department of Overseas Trade (Stationery Office, 6d.) is by Mr. G. F. Braddock, Senior Trade Commissioner in that country. It traces the course of Anglo-Irish trade during the last twenty or thirty years and shows that shortly before the war started relations had taken a turn for the better after a long period of dispute and "trade war."

In 1939 Eire imported electrical goods and apparatus to the value of £900,000 (about the same as in 1938); of this the United Kingdom supplied £465,000 (against £451,000). It is seen that this trade kept on a fairly even level during the last five pre-war years. Germany's share of the Irish electrical import trade in 1938 consisted principally of electrical machinery (£104,117), insulated wires and cables (£159,912) and "other electrical apparatus" (£124,631). Boilers and boiler plant to the value of £60,968 were also supplied.

One outcome of the war was to make Eire more dependent economically upon Great Britain, but the latter could not meet all the requirements and, as most other countries, Eire is suffering from grave shortages in a number of directions; this had the effect, however, of giving the country a favourable overseas trade balance during the years 1941-44.

As regards the future of Anglo-Irish trade, Mr. Braddock considers that while the tariff protection of native industries will continue there is a point beyond which industrial development ceases to be economical. If Eire is to find a market in Great Britain for her agricultural produce there should be a reverse flow of manufactured goods from this country to Eire.

Mention is made in the review of the considerable electrical development which has been proceeding in recent years, raising the output from 20 kWh per head in 1924 to 151 kWh in 1941-42.

Irish Power Projects

New Hydro-Electric and Turf Stations

IN an address on "The Exploitation of Water Power in Ireland" on February 1st, MR. J. A. O'RIORDAN, M.A., B.E., assistant chief engineer in the Civil Works Department of the Electricity Supply Board, gave details of the Board's new hydro-electric projects. He said that work on the Erne scheme had already started. This river offered the largest potential undeveloped source of water power of any in the country. Provision had been made for two generating stations with an eventual plant capacity of 80,000 kW, giving an average annual output of 200,000,000 kWh and upwards. On the lower River Liffey (at Leixlip) it was proposed to build a power station, with an installed capacity of about 4,000 kW some distance below the Salmon Leap Falls. Arrangements were in hand with a view to the commencement of the main construction works in the coming building season. He also referred to the Upper and Lower Lee development, a project on the Tore River, Co. Kerry, and others on the Cummeragh River, Co. Kerry, and the Clady River, Co. Donegal. With regard to the Boyne, conditions were found to be unfavourable at the dam site.

With Ardnacrusha and Poulaphouca, the total yield of energy from water power exploited by the E. S. B. system would reach from 550 to 600 million kWh per annum. Even if atomic energy were successfully adapted to industrial power uses, it seemed unlikely that it could result in making obsolete existing hydro-electric developments because, excluding capital charges, it would be difficult to imagine any cheaper source of power. If the total capital investment in the Shannon scheme were written off, the cost of production of energy would be no more than 0·06d. per kWh.

Speaking in the discussion, Mr. Sean Lemass, Minister for Industry and Commerce, said it was clear that the demand for electricity would increase at an average rate of 40 million kWh a year for ten years following the restoration of normal conditions without taking into account the effect of the "damming-up" of demand since 1942. The capacity of the new stations already decided upon would be: Erne, 50,000 kW, which might eventually become 80,000 kW; Leixlip, 4,000 kW; Clonsast, 20,000 kW; and the 30,000 kW Brosna-area turf station. Clonsast was expected to be in production by the winter of 1948 and the Erne and Leixlip stations in 1949. The estimated cost of the new projects was £5,520,000 (Erne £3,200,000; Clonsast £800,000; Leixlip £320,000; and Brosna £1,200,000).

Photometer Specification

A REVISED version of B.S. 354, dealing with photometric integrators, has just been issued. The chief change is in size, which has been extended to provide for tubular lamps, fluorescent and otherwise. The formula for paint for coating the interior of integrators has also been revised.

There has been a re-issue of B.S. 667, concerned with portable photometers of the photo-electric type, the principal modification being the reduction of the figure of chance to 5 per cent. in respect of the indication of the colour of the light source. A note has been added to the clause on oblique illumination, pointing out that the more stringent requirement to be satisfied when illumination of less than 1 ft.-candle is in question ensures that the error of the instrument shall not be excessive for street lighting and similar measurements.

Copies of both documents are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, for 2s. each.

Forthcoming Events

Monday, February 25th.—*Bristol.*—Grand Hotel, 6 p.m. I.E.E. Western Centre (Installations Group). Informal dinner meeting. Short opening talks, "Is an Electrical Proving House Needed?" by R. H. Cobbold, and "Electrical Problems associated with Paper Making Machinery," by A. C. Warman.

Newcastle-on-Tyne.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Operational Control of Electricity Supply Systems," by W. Kidd and E. M. S. McWhirter.

London.—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Informal meeting. Discussion on "Practical Experience of Arc-Suppression Coils," to be opened by H. Willott Taylor.

Tuesday, February 26th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Radio Section. Discussion on "Comparison of Electrostatic and Magnetic Deflection in Cathode-Ray Tubes," to be opened by V. A. Stanley and E. W. Bull.

School of Tropical Medicine, Gower Street, 7 p.m. Society of Instrument Technology. "The Effect of Design of Boiler Auxiliaries on the Choice and Performance of Automatic Control," by J. E. O'Breen.

Glasgow.—Royal Technical College, 6.15 p.m. I.E.E. Scottish Centre. "Excess Current Protection by Overcurrent Relays on Medium Voltage Circuits," by A. G. Shreeve and P. J. Shipton, and "Excess Current Protection by H.R.C. Fuses on Medium Voltage Circuits," by R. T. Lythall.

Manchester.—Midland Hotel, North-Western and North Wales E.D.A. Seventeenth annual luncheon.

College of Technology, Sackville Street, 6.45 p.m. British Institution of Radio Engineers (North Western Section). "Gold Film Electrodes for High Frequency Quartz Plates," by R. Spears.

Wednesday, February 27th. — *Aberdeen.* — Caledonian Hotel, 7.45 p.m. I.E.E. Scottish Centre. "Excess Current Protection by H.R.C. Fuses on Medium Voltage Circuits," by R. T. Lythall.

Thursday, February 28th.—*Plymouth.*—Grand Hotel, The Hoe, 3 p.m. I.E.E. Devon and Cornwall Sub-Centre. "The Training of Electrical Craftsmen," by J. B. J. Higham.

Friday, March 1st.—*Newcastle-on-Tyne.*—Neville Hall, Westgate Road, 6.30 p.m. I.E.E. North-Eastern Centre (Students' Section). "Electrical Machinery for Ship Propulsion," by W. J. Belsey.

Manchester.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre (Radio Group). "Tendencies in the Design of the Communication Type of Receiver," by R. B. Armstrong and G. L. Grisedale.

Birmingham.—Grand Hotel, 6.30 p.m. Birmingham Electric Club. Annual dinner.

Nottingham.—Victoria Station Hotel, 6.45 for 7.15 p.m. I.E.E. East Midland Sub-Centre. Annual dinner.

Monday, March 4th.—*Birmingham.*—James Watt Institute, 6 p.m. I.E.E. South Midland Centre. "Excess Current Protection by H.R.C. Fuses on Medium Voltage Circuits," by R. T. Lythall, and "Excess Current Protection by Over Current Relays on Medium Voltage Circuits," by A. G. Shreeve and P. J. Shipton.

Tuesday, March 5th.—*Manchester.*—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre. "The Operation of Large Turbo-Alternators to Reduce Rotor-Winding Deformation," by R. H. Coates and B. C. Pyle.

Coventry.—Electricity Showrooms, Corporation Street, 6 p.m. Coventry Electric Club. "Electric Welding with particular reference to Arc Welding," by M. Riley.

Sheffield.—The University, Western Bank, 6 p.m. Illuminating Engineering Society, Sheffield Centre (North Midland Area). "Brightness," by W. D. Wright.

Luton.—Town Hall, 7.30 p.m. Luton Electrical Society. Informal meeting. "Electric Vehicles."

Electrical Commercial Travellers

THE annual luncheon of the Electrical Trades Commercial Travellers' Association at the Connaught Rooms last Friday marked the Association's twenty-first birthday. There was an attendance of about 500, and Mr. B. E. Crow, the chairman presided. The toast of the Association was proposed by Mr. H. S. Pocock (*Electrical Review*) who referred to the disappointment of electrical commercial travellers, particularly those returning from the Forces, at their inability to get on with their job owing to a shortage of supplies. He regarded the travellers as the "Commandos" of peace and suggested as a slogan for them "Give us the goods and we will finish the job."

Mr. F. Winstanley, the president, replied. He said that the founder members present could be justly proud of the growth of their Association; he made particular reference to the first chairman, Mr. Ernest Joyce. Mr. Winstanley said that practically the whole of the members who were eligible had served in some arm of the Forces and fortunately there had been no casualties among them. Paying a tribute to the past-president (Mr. E. Moir) and the past-chairman (Mr. J. G. Edwards), he said that during their year of office they had enrolled 63 new members. Since that, however, a further 125 had been enrolled raising the total to 433, more than double the 1939 membership. The Committee was considering the organisation of a summer outing, a social evening for members' ladies and friends and lectures on subjects of direct interest to electrical travellers. He assured members that the leaders of industry were sparing neither pains nor expense in getting the wheels turning again.

The health of the guests was proposed by Mr. C. L. Elvy, who thanked the Committee on behalf of the Association's Service members for the parcels sent them during the war, and Mr. V. Z. de Ferranti responded. The chairman's health was proposed by Mr. J. G. Edwards.

An appeal by the charities steward, Mr. S. Johnson, resulted in the collection of over £100.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The English Electric Co., Ltd.—After providing for taxation the profit for 1945 was £442,668, compared with £434,984 for 1944. The dividend on the ordinary stock is being maintained at 10 per cent.

The London Passenger Transport Board.—The net revenue for 1945 available for interest on the London Transport stocks, after giving effect to the estimated operation of the financial arrangement in connection with Government control and including the balance of the "C" stock interest fund, is £4,687,352. This compares with £4,673,286 for 1944, the increase being accounted for by profits on the sale of investments and a credit from adjustments in respect of the previous years. A sum of £3,901,381 is required for interest on prior charge stocks, leaving £785,971 for the service of the "C" stock, on which a final dividend of 1¾ per cent. is to be paid, again making 3 per cent. for the year. The remaining £15,007 is transferred to the "C" stock interest fund.

The Southern Railway Co. reports a total net revenue for 1945 of £6,989,301, compared with £7,000,052 for 1944. After meeting the interest and dividends on the pre-ordinary stocks the amount available for dividend on the ordinary stocks is £2,076,930. A final dividend of 2½ per cent. is being paid on the preferred ordinary stock making 5 per cent. (same) for the year, and the distribution on the deferred ordinary stock is maintained at 2 per cent.

R. B. Pullin & Co., Ltd., report a profit of £51,627 for the year ended September 30th last, compared with £82,420 for the preceding eleven months. Tax provision amounts to £37,975 (£68,774), £4,000 (£5,000) is allocated to general reserve and a final dividend of 12½ per cent. is paid, making 17½ per cent. for the year; a similar dividend was paid for the eleven months to September 30th, 1944, but in the last full year (1942-43) 20 per cent. was distributed.

British Industrial Plastics, Ltd., reports a net profit for the year to September 30th last of £23,516 (against £21,705). It is proposed to pay a dividend of 8 per cent. (same), the carry-forward being increased from £10,164 to £12,594.

The Decca Record Co., Ltd.—At meetings held last week resolutions were unanimously carried approving the issue of 600,000 5 per cent. cumulative preference shares of £1 each at 20s. 7½d.

Richard Johnson, Clapham & Morris, Ltd., have declared an interim dividend of 3¾ per cent. (same).

International Combustion, Ltd.—The gross profit for 1944-45, before meeting taxation, was £206,283 (against £218,368). The final dividend is 27½ per cent., again making 32½ per cent. Last year the total included a 12½ per cent. bonus.

Henry Meadows, Ltd.—Accounts just published show net profits of £27,951 for the year ended August 31st, 1944, and £31,873 to the end of August, 1945. In 1943-44 first and second interim dividends aggregating 25 per cent. were paid, no final dividend being recommended, and for the past year it is proposed to maintain the total distribution at the same amount by a final payment of 17½ per cent.

Clarke, Chapman & Co., Ltd., report a net profit of £103,397 for the past year, against £107,401 for 1944. The ordinary dividend is again 12½ per cent.

New Companies

Domestic Fans, Ltd.—Private company. Registered February 13th. Capital, £10,000. Objects: To acquire from M. T. Adamtchik and J. R. Kennedy, or one of them, a sole and exclusive licence under patents granted to them to manufacture and sell fans, guide vanes, casings, shutters or other devices, components of ventilating units; to manufacture, sell or deal in ventilating, heating, cooling or air conditioning equipment and to carry on business as engineers specialising in such equipment. The directors are: M. T. Adamtchik, 46, Garden Avenue, Brighton, and J. R. Kennedy, 20, Upper Park Road, N.W.3 (directors of Rolascrews, Ltd.). Registered office: 20, Upper Park Road, N.W.3.

London Electrical Wholesalers, Ltd.—Private company. Registered February 12th. Capital, £500. Objects: To carry on the business of manufacturers, wholesalers and factors of, and dealers in, all kinds of electrical equipment, etc. The permanent directors are N. Chamberlist, 12, York Place, London Road, Brighton, and D. M. Ambrose, 29, Kensington Park Gardens, S.W. (directors of N. Chamberlist, Ltd.). Registered office: 4, Broad Street Buildings, Liverpool Street, E.C.2.

D & D Electrical Installations, Ltd.—Private company. Registered February 13th. Capital, £1,000. Objects: To carry on the business of installers or manufacturers, repairers and hirers of electrical and mechanical apparatus, accessories and components, radio sets, etc. The directors are: H. W. Durtnell, 16b, Lee Terrace, Blackheath, S.E.3, and L. S. Davies, 216, Vaughan Road, West Harrow, Mdx. Registered office: 2, Disraeli Road, Putney, S.W.15.

G. & G. Electrical Engineers, Ltd.—Private company. Registered February 12th. Capital, £300. Objects: To carry on the business of electrical, radio, lighting, telephone, mechanical, motor and general engineers and engineering contractors, designers, repairers and maintainers of, and dealers in, neon and other systems of lighting, etc. Directors: J. F. Gale, 220, Beverley Drive, Queensbury, Edgware, Middlesex, and J. H. Gabbey, 19, Ashcombe Gardens, Edgware, Middlesex. Registered office: 220, Beverley Drive, Queensbury, Edgware, Middlesex.

Hill Porter (Newcastle), Ltd.—Private company. Registered February 5th. Capital, £1,000. Objects: To carry on the business of manufacturers, installers, repairers and factors of, and dealers in, heating and lighting plants,

dynamos, motors, generators, batteries, wires, cables, telephone, radio and television equipment and supplies, and electrical plant and machinery, electrical, mechanical, motor and general engineers, etc. Directors: M. L. Hill, 29, Kenton Road, Kenton, Newcastle-on-Tyne (director of Electricals, Ltd.) and N. Porter, 9, Kings Road, Monkseaton, Northumberland (director of Watson Norie, Ltd.). Registered office: 82, Osborne Road, Jesmond, Newcastle-on-Tyne.

H. Watson Electrical Engineering Co., Ltd.—Private company. Registered February 6th. Capital, £200. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, conductors and general electrical plant, etc. Directors: J. Silverman, 42/21, Seymour Street, W.1, and D. B. Trip, 29, Spring Hill, E.9. Registered office: 100, Clifton Hill, St. John's Wood, N.W.8.

Crowne Electronic Engineering Laboratories, Ltd.—Private company. Registered February 8th. Capital, £5,000. Objects: To carry on the business of manufacturers, manufacturers' agents, wholesale agents and suppliers of plastics, geophysical instruments, electrical accessories, batteries, accumulators, wireless and television sets, etc. Directors: A. A. J. Crowne and Joan G. Crowne, both of 7, Regent Terrace, Penzance. Registered office: Regio Mill, Culval, Penzance.

Davic Equipment, Ltd.—Private company. Registered February 1st. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, electrical, gas and oil lamps, quartz lamps, reflectors, bells, fires, stoves, cookers, switchboards, control gear, fans, etc. Directors: D. De La Fuente and Mrs. Victoria De La Fuente, both of 148a, Oxford Road, Cowley, Oxford. Registered office: 236, Baker Street, N.W.1.

Northern Lights (Cricklewood), Ltd.—Private company. Registered January 31st. Capital, £1,000. Objects: To carry on the business of electrical contractors and engineers, electricians, mechanical engineers, builders and decorators, sign contractors, etc. Directors: C. R. Lyon, 52, Holden Road, North Finchley, N.12, and F. R. Howell, 40, Hendon Way, N.W.2. Registered office: 420, Seven Sisters Road, N.4.

Peter Lawrence, Ltd.—Private company. Registered January 31st. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, domestic, household and general electrical and other equipment, fittings and appliances, including lamps, electrical clocks, washing and cleaning machines, refrigerators, etc. Catherine Woolfe, 88, Linkside, N.12, is the first director. Registered office: 88, Linkside, North Finchley, N.12.

Wm. F. Robins & Co., Ltd.—Private company. Registered January 30th. Capital, £1,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists and contractors, heating and ventilating engineers, etc. Directors: W. F. Robins, 17, Great Whyte, Ramsey, Hunts, and two others. Registered office: 22, Great Whyte, Ramsey, Hunts.

Lee Products (Great Britain), Ltd.—Private company. Registered February 1st. Capital, £2,000. Objects: To carry on the business of manufacturers and designers of, dealers in, and distributors of, all kinds of wireless and television apparatus, domestic, electrical and mechanical appliances and equipment, electrical and radio installations, etc. Directors: G. S. Lee and Mrs. Joan Lee, both of 38, Wick Hall, Hove, Sussex. Registered office: Radio House, 48, East Street, Brighton.

J. B. Electric, Ltd.—Private company. Registered February 6th. Capital, £1,000. Objects: To carry on the business of electrical, motor, radio and general engineers, etc. Directors: J. A. Bancroft and Kathleen Bancroft, both of 16, Radlet Drive, Timperley, Altrincham. Registered office: 199, Manchester Road, Broadheath, Altrincham, Ches.

Electrical Requirements, Ltd.—Private company. Registered February 4th. Capital, £500. Objects: To carry on the business of electrical and general engineers, smiths, machinists, etc. Subscribers: E. T. Peckham, C.A., Abbey House, Baker Street, N.W.1, and Nancy Hudson, 95, Elm Avenue, Eastcote, Middlesex. Secretary: E. T. Peckham.

Increases of Capital

Lancashire Electric Light & Power Co., Ltd.—The nominal capital has been increased by the addition of £2,000,000 beyond the registered capital of £4,571,415. The additional capital is divided into 1,000,000 3¾ per cent. cumulative preference and 1,000,000 unclassified shares of £1 each.

Kempston Electrical Co., Ltd.—The nominal capital has been increased by the addition of £7,000 beyond the registered capital of £2,000. The additional capital is divided into 1,000 deferred or founders', 2,000 ordinary and 2,000 5 per cent. cumulative preference shares of £1 each; and 8,000 employees' shares of 5s. each.

Joseph Adamson & Co., Ltd.—The nominal capital has been increased by the addition of £18,000 beyond the registered capital of £62,000. The additional capital is divided into 18,000 6 per cent. cumulative redeemable preference shares of £1, without voting rights except in special circumstances.

H. J. Electrical Services, Ltd.—The nominal capital has been increased by the addition of £4,000, in £1 shares, beyond the registered capital of £1,000.

N. Chamberlist, Ltd.—The nominal capital has been increased by the addition of £500, in £1 ordinary shares, beyond the registered capital of £100.

Mortgages and Charges

T. Beadle & Company, Ltd.—Three legal charges on (1) 3, 4 and 5, Castle Street and Boyes Yard, Castle Street, Hull; (2) 370, Cleethorpe Road, Grimsby; and (3) 372, Cleethorpe Road, Grimsby, all dated January 23rd, 1946, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Barlite Lamps, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated January 25th, 1946, to secure £1,000. Holder: F. D. Parkinson, 23, Hastings Road, Thornton, Blackpool.

STOCKS AND SHARES

THE general aspect of Stock Exchange markets alters but little from week to week. Prices of purely investment stocks keep good, the tendency being on the whole in the upward direction, fostered by the Government's continued intention to keep down money rates. This answers well from the national point of view, though from that of the investor who is dependent for his income—or part of it—upon dividends derived from fixed-interest securities, the incessant reduction in money rates is a matter for concern. Prices of front-rank ordinary stocks and shares, and those of good class preferences, keep their levels with a degree of strength that witnesses to the demand for conservation of capital: to many people a greater desideratum nowadays than is actual return upon the money invested.

Nationalisation

It now appears that, in a number of eventualities, the individual shareholder in a nationalised company is to receive a marketable security which he will be free to dispose of as he wills. These eventualities include a liquidation, a return of capital, or a debenture redemption. Companies intending to raise funds for their development in some other productive activities may also, it seems, apply to the Treasury for permission to cash their compensation scrip.

In conjunction with the provisions of the Control of Investment Bill, which tend to make permanent the Government control of capital and investment, Mr. Dalton's recent statement has helped towards further gains in the prices of gilt-edged securities. At the same time, he did something to fortify the spirits of shareholders in the industries earmarked for nationalisation.

Yorkshire Electric and Compensation

Current rates of dividend are not by any means the chief considerations which govern the present valuation of shares in undertakings likely to be purchased by the Government. Both past and potential earnings, it is assured, will figure largely in the calculations of compensation. The chairman of the Yorkshire Electric Power Co., drew particular attention in the company's report to another, and more easily disregarded, factor in the equation namely the position of capital sunk on a long-term policy, as distinct from the more quickly productive kind of expenditure.

This statement puts clearly the case against Government ownership and the claims which, in the event, the undertakings will have in the matter of compensation. To the question of whether the company can maintain the dividend at 9 per cent., the chairman's answer is in the affirmative—provided political experiments are left until after the immediate problems of reconversion and recovery have been dealt with. At 43s. the price is harder, allowing for deduction of the dividend from the price.

Lancashire Electric

The readiness of the public to subscribe for the million pounds of 3¾ per cent. preference shares issued at 20s. by the Lancashire Electric Power Co., continues to be the subject of comments. The issue was well over-subscribed and applicants for the larger numbers of shares had to be scaled down. The price now stands at a premium of from 6d. to 9d. At the latter, the return on the money is no more than £3 13s. 6d. per cent. The incident illustrates the investment demand which prevails nowadays for gilt-edged security from which the element of possible depreciation is lacking. It is difficult to suppose that in the event of nationalisation, the new Lancashire preference would receive less than their par value of 20s. and, recognising this, the investor is content to accept a modest rate of interest on his money in order to ensure, so far as he can, the safety of his capital.

Home Railway Dividends

The Southern Railway provided the Home Railway market with a disappointment by declaring no more than 2 per cent. on the deferred stock. After the rise in the L.M.S. dividend from 2½ to 4 per cent., as noted here last week, expectation looked for an improvement in the Southern distribution, and the immediate effect of the latter's declaration was a fall of 3 points in the deferred, from 25 to 22, while the preferred came down from 78 to 75. Both stocks showed a small recovery from the lowest. London Passenger Transport "C" stock is again to receive 3 per cent. for the past year, and last week's rise of 3 points to 63 has been retained. Thomas Tilling shares continue a good market, another advance raising the price to 53s. 9d. British Electric Traction deferred, at 1065, is 30 points up.

Price Fluctuations

Electric Supply Corporation ordinary are 6d. higher at 45s. Other prices in this group to improve were North Eastern Electrics, 33s., Scottish Power 37s. and Electric Finance 55s. 9d. Changes in the overseas list include a fall of 6 points in Tokyo Electric sixes, to 46½. Cawnpore Electrics are better at 66s. 6d. Victoria Falls keep good at 5⅝.

Ericsson Telephones have risen 2s. 6d. to 56s. 3d. Siemens at 39s., Lancashire Dynamo at 5 $\frac{23}{32}$, Ever Ready at 46s., Hopkinsons at 91s. 3d., and Walsall Conduits at 54s. 6d. are among the shares that show improvement. Newman Industries at 9s. 6d. and Allen Wests at 9s. are both 3d. better. English Electric shares hardened to 56s., the dividend again being 10 per cent., for the ninth consecutive year. The yield is but £3 12s. 6d. per cent., but the company's prospects justify the quotation.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

AKT. Ges. Brown, Boveri & Cie.—" Means for protecting electrical direct-current installations against reverse currents." 3473/44. March 12th, 1943. (575070.)

D. G. Ashcroft, W. Sever and Imperial Chemical Industries, Ltd.—" Manufacture of electric fuseheads." 9093. July 18th, 1941. (575094.)

Automatic Telephone & Electric Co., Ltd., J. F. Mackenzie and S. B. Jones.—" Electrical signalling systems." 3018. February 18th, 1944. (575036.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Ignition systems for internal-combustion engines." 9507. May 17th, 1944. (575115.)

British Thomson-Houston Co., Ltd., R. T. Coe, T. F. Robinson and D. F. Welch.—" Ignition systems for internal-combustion engines." 2361. February 8th, 1944. (575016.)

Brush Development Co.—" Piezo-electric devices." 21148/43. December 16th, 1942. (575068.)

J. E. I. Cairns.—" Electron discharge devices employing hollow resonators." 10105. August 8th, 1941. (574997.)

Callender's Cable & Construction Co., Ltd., D. T. Hollingsworth and C. W. J. Morley.—" Wave guides for high-frequency electric currents." 12969. July 6th, 1944. (575023.)

Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—"Direct current networks protecting devices." 3756/41. July 28th, 1939. (574974.)

English Electric Co., Ltd., J. K. Brown, A. R. Blandford and F. G. Rowland.—" Gas blast circuit breakers." 3639. February 28th, 1944. (575108.)

A. D. Ferguson and Metropolitan-Vickers Electrical Co., Ltd.—" Electric cables." 15258. November 26th, 1941. (575097.)

General Electric Co., Ltd., R. L. Breadner and C. H. Simms.—" Manufacture of glass-sheathed wires." 3627. February 28th, 1944. (575084.)

General Electric Co., Ltd., and E. Friedlander.—" Combinations of electric discharge lamps with means for operating them." 331. January 7th, 1944. (574980.)

S. Hill.—" Electron discharge devices employing hollow resonators." 707. January 17th, 1941. (574972.)

Holophane, Ltd., and S. English.—" Aerodrome ground lighting." 769. January 14th, 1944. (574982.)

D. I. Lawson and Pye, Ltd.—" Apparatus for determining the distance of an object by means of a reflected radio wave." 13999. September 9th, 1940. (574965.)

G. Liebmann and Cathodeon, Ltd.—" Picture reproduction tubes especially for television." 14913. November 20th, 1941. (575060.)

Mond Nickel Co., Ltd. (International Nickel Co., Inc.).—" Permanent magnets." 20642. December 9th, 1943. (Addition to 541474.) (575102.)

M-O Valve Co., Ltd., and N. L. Harris.—"Electric apparatus, using velocity modulation." 15018. October 8th, 1940. (574969.)

M-O Valve Co., Ltd., N. L. Harris and R. F. Proctor.—" Tunable hollow electrical resonators." 15017. October 8th, 1940. (574968.)

M-O Valve Co., Ltd., J. W. Ryde and R. W. Sloane.—" High-frequency electrical oscillators and frequency-changers." 15016. October 8th, 1940. (574967.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & Co.—" Terminal contact devices for electrical apparatus." 10625/41. July 1st, 1940. (575058.)

Plessey Co., Ltd., and H. V. G. Stubbs.—" Spark gaps for use in high-frequency ignition systems for internal-combustion engines." 8298. July 1st, 1941. (574996.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Alternating current instruments." 3252. February 22nd, 1944. (575041.)

Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington.—" Sources of infra-red rays." 2594. February 11th, 1944. (574989.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Electric signalling systems." 2078. February 4th, 1944. (575035.)

Standard Telephones & Cables, Ltd., and W. H. D. Yule.—" Electro-magnetic relays." 18378. November 5th, 1943. (574975.)

R. Trist & Co., Ltd., and T. L. Wakley.—" Magnetic devices for transmitting energy." 3552. February 25th, 1944. (575077.)

D. Weighton and Pye, Ltd.—" Frequency meters." 13998. September 9th, 1940. (574964.)

Westinghouse Electric International Co.—" Semi-conducting compositions." 20210/43 December 3rd, 1942. (575029.)

E. L. C. White.—" Electrical combining circuit arrangements." 21678. December 24th, 1943. (574978.)

Wolseley Sheep Shearing Machine Co., Ltd., and H. J. Macnamara.—" Cases of electric apparatus for use with electric fencing." 20996. December 15th, 1943. (574976.)

Gas Turbines

CLAIMED to be the largest natural-gas turbine, a 15,000-HP machine now being built by Brown-Boveri in Switzerland is to be installed at Bucharest, Roumania, for meeting peak loads and to serve as a standby. Existing plant at the station comprises two 9,000-HP and one 6,000-HP Diesel sets. The last named has been converted to run on natural gas, so that the capacity of the station will be 18,000 HP using oil and 21,000 HP using natural gas. A special laboratory for research work in connection with gas turbines is to be installed in the Massachusetts Institute of Technology, of Boston, U.S.A. The laboratory will comprise a supersonic wind tunnel and equipment for research work in connection with the elements of compression and combustion.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bedford.—February 28th. Electricity Department. H.v. and l.v. cables for twelve months. (February 8th.)

Brighton.—March 4th. Electricity Department. Eight 500-kVA three-phase transformers. (February 15th.)

Bristol.—March 8th. Electricity Department. Joint boxes, fuse boxes, cables and flexibles, etc. (See this issue.)

Dover.—March 8th. Corporation. Cables, transformers, kiosks and meters for twelve months. (See this issue.)

Dundee.—March 6th. Public Lighting Department. Supply of pillars, brackets, lanterns and accessories for electric street lighting. (See this issue.)

East Ham.—March 2nd. Electricity Department. Electric cookers and storage tanks for twelve months. (February 15th.)

Edinburgh.—March 7th. City Council. Electricity meters for twelve months. (See this issue.)

Hammersmith.—March 7th. Borough Council. Annual contract for cables. (See this issue.)

Hull.—February 25th. Electricity Department. Five electric battery vehicles. (February 15th.)

Irlam.—March 2nd. U.D.C. Supply of electric lamps for twelve months. Surveyor, Council offices.

Kirkcudbright.—March 9th. County Council. Electrical work at 100 houses. Schedules (£1 1s.), county clerk.

Littleborough.—February 28th. Electricity Department. Underground cables and substation equipment. (February 8th.)

Manchester.—March 4th. Electricity Department. Domestic electric cookers for twelve months. (February 15th.)

Radcliffe.—March 6th. Electricity Department. One 6,000-kVA transformer. (February 15th.)

Tredegar. — March 9th. Urban District Council. Two-panel 11-kV metal-clad switchboard. (February 15th.)

March 9th. Electrical stores and requirements for twelve months. (See this issue.)

Tynemouth.—February 28th. Borough Council. Supply of electric lamps for twelve months. Borough surveyor, 19-20, Howard Street, North Shields.

Sleaford.—March 11th. Electricity Department. Supply and laying of e.h.v. and l.v. underground cables. (See this issue.)

Reigate.—March 8th. Electricity Department. Two 500-kVA and four 400-kVA transformers and two sheet steel kiosks complete with e.h.v. and l.v. equipment. (See this issue.)

Wolverhampton.—March 29th. West Midlands J.E.A. Cables and distribution boards at Ocker Hill generating station. (See this issue.)

Workington.—March 18th. Electricity Department. E.h.v. and l.v. switchgear. (See this issue.)

Orders Placed

Bradford.—Electricity Committee. Accepted. Voltage regulator and balancer.—Ferranti.

Carlisle.—Electricity Committee. Accepted. Lighting and auxiliary power sockets and wiring at power station (£5,194).—David Thomson & Sons.

Dunblane (Perthshire).—Town Council. Accepted. Electrical work at 32 permanent houses.—Miller & Stables.

Isle of Wight.—Health Committee. Accepted. Lighting and power points, St. Mary's Hospital (£91).—General Electrical Services.

Lancashire.—Education Committee. Installation of electric lighting at the Western Modern School, Great Harwood (£699).—The Broughton & Irlam Electrical Engineering Co.

Leicestershire.—Hospitals Committee. Accepted. Electrical installation at Carlton Hayes Hospital (£23,956).—Electrical Installations, Ltd.

Manchester.—Housing Committee. Accepted. Electrical installations: Rackhouse and Lawton Moor estates (70 houses) and Benchill estate (38 houses).—D. Foote. Hulme residential flats.—A. E. Sudlow & Co.

Newcastle-under-Lyme.—Corporation. Accepted. Overhead wiring and services to 101 houses on the Beasley Farm estate (£776).—Newcastle Electrical Co.

Housing Committee. Overhead wiring and electrical services to 101 houses on the Beasley Farm estate (£776).—Newcastle Electrical Co.

Warrington. — Transport Committee. Accepted. Electrical test bench (£314).—Armature Manufacturing Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arbroath.—Extensions to foundry, Applegate works; Keith Blackman Co., Ltd., High St.

Bermondsey.—Reinstatement of flats, Tabard Street estate, etc. (£38,170); Walter Lawrence & Son, Ltd.

Billericay.—Permanent houses (54), Rectory Road site; H. B. Mayhew, surveyor, Council Offices.

Birkenhead.—Pasteurised milk depot, Saughill Massie Road; Wirral Milk Supplies, Ltd.

Birmingham. — Houses (274), Chestnuts estate; H. J. Manzoni, city architect, The Council House.

Blackpool.—Houses (284), near Clifton Road; Clifton Building Co., Ltd.

Burton-on-Trent.—Mixed school, Waterside; borough engineer.

Bury.—Houses (164), Fairfield estate; borough engineer, Bank Street.

Cardiff.—Works extensions, Ely river bank; Thomas Owen & Co.

Chingford.—Permanent houses (138), Ropers Fields estate; H. Watkins and J. Decker, architects, 13, Gray's Inn Square, W.C.1.

Consett.—Houses (89) at Hamsterley and Leadgate for U.D.C.; J. J. Eltringham, architect, Derwent Street, Blackhill.

Houses (68), Delves Lane for U.D.C.; R. C. Williamson, builder, Rowlands Gill.

Cornwall.—Additions at Tehidy sanatorium (£77,150); county architect, County Hall, Truro.

Darlington.—Houses (104), Brankin Moor; borough engineer.

Dunston-on-Tyne.—Factory for the Fibreboard Boxes Co., Ltd.; H. E. Pitt & Co., Leopold Street, Millfield, Sunderland.

Durham.—Houses (500), for Durham R.D.C.; G. W. Baker, Byland Lodge, Durham.

Eccles.—Houses (140), Alder Park estate (£154,000); borough engineer.

Glasgow.—New nurses' home and maternity block, Southern Hospital; city architect.

Grangetown (Yorks.).—Hotel (£22,000); Tadcaster Brewery Co., Ltd.

Greenwich.—112 flats (£136,816), Cherry Orchard estate; borough engineer.

Hatfield.—Factory, North Mymms; British Armour Clad Batteries, Ltd.

Hebburn-on-Tyne.—Offices for Palmers Hebburn Co., Ltd.; Cackett, Burns, Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Isle of Wight.—School, Northwood Park, Cowes (£48,000); county architect, County Hall, Newport, I.W.

Jarrow.—Forty flats and 12 semi-detached houses, and 100 houses at Bilton Hall for T.C.; borough engineer.

Kibworth.—Extensions, Grammar School (£3,600); Leicestershire county architect.

Lambeth.—Tenements, Kennington Park estate (£26,000); L.C.C. architect.

Leicestershire.—Ten school canteens (£7,817); county architect.

London.—Hospital war damage repairs (£2,646,000); L.C.C. architect.

Manchester. — Houses (235), North-West Neighbourhood Unit, Wythenshawe; Housing Department Office, Town Hall.

Morpeth.—Extensions to works; Swinney Bros., Ltd., Wansbeck Ironworks.

Newcastle-on-Tyne.—Works extensions for E. Baker & Co., Ltd., Blenheim Street; Hetherington & Wilson, County Chambers, Westgate Road.

Norfolk. — School, Thorpe St. Andrew (£55,000); C. H. Thurston, county architect, 25, Thorpe Road, Norwich.

North Shields.—Extension of works (to include new laboratories) for Cookson, Ltd., lead manufacturers; E. M. Lawson, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Rochdale.—Rebuilding scheme for Infirmary (£300,000); W. Wynne, superintendent-secretary, Infirmary Board.

Rugby.—Permanent houses (136), Overslade estate; borough surveyor, Burford House, Church Walk.

St. Pancras.—Rebuilding flats, Ossulton estate (£22,000); L.C.C. architect.

Salford.—Heating at hospital and children's homes (£25,000); J. Roger Preston & Partners, consulting engineers.

Houses (110), Summerville estate (£125,155); John Laing & Son, Ltd.

Shrewsbury.—Permanent houses (100), Crowmoor; S. T. Walker, architect, James Cond Buildings, Charlotte Street, Birmingham, 3.

South Kesteven.—Houses (48), Morton, for R.D.C.; W. E. Norman Webster, architect, 1a and 2a, Station Street, Spalding.

Southport.—Permanent houses (84), for Town Council; Livesey & Co., builders, Houghton Street.

Stepney.—Tenements, Quaker Street (£20,397); Ashford Builders Co., Ltd.

Stockton-on-Tees.—Iron foundry for Head Wrightson & Co., Ltd.; company's own architects.

Stretford.—Houses (220), Sandy Lane estate; borough engineer.

Sunderland.—Kitchen and dining accommodation at schools (£100,000) and two community centres (£70,000) for the T.C.; borough engineer.

Surrey.—School, Kingston Vale, New Malden; county architect, County Hall, Kingston-on-Thames.

Swindon.—Completion of Drove school (£10,000); R. J. Leighfield & Sons, Ltd.

Houses (100); E. Cole, architect, Cirencester, and E. H. Underwood, consulting engineer, Bristol.

Torquay.—Printing works and offices, 23-24, Union Street; *Herald & Express.*

Tynemouth.—Factory, Tyne Plywood Works, Ltd. (£300,000); Jack Cotton, Ballard & Blow, architects, Birmingham.

Watford.—Factory, North Western Avenue; Shellabear Price, Ltd.

Housing schemes; Ley, Colbeck & Partners (at Leavesden) and Dawe & Carter (at Abbots estate).

Weston-super-Mare.—Permanent houses (104), Bourneville estate; H. L. Lloyd, borough engineer.

Weardale (Co. Durham).—Houses (21), for Weardale R.D.C.; F. J. Eltringham, Derwent Street, Blackhill, Co. Durham.

Worcestershire.—Additions to 37 schools in the county; county architect, 38, Foregate Street, Worcester.

TRADE MARKS

APPLICATION has been made for the registration of the following trade mark. Objections may be entered within one month of February 13th:—

Design. Class 11. No. 637,013. "Hair drying apparatus and appliances."—Kerka's Permanent Waving, Ltd., 77, New Bond Street, London, W.1.

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVIII. No. 3562. MARCH 1, 1946 9d. WEEKLY

Freedom of Movement

Imminent End of Essential Work Orders

FOR the efficient prosecution of the war a tighter control of industry was instituted and although that control was sometimes tighter than even the urgent circumstances demanded it was accepted by both employers and employees as necessary. One method of regulation adopted was by way of Essential Work Orders. These varied in detail from industry to industry but the general form was the same.

Their object was to prevent the unnecessary movement of individuals from job to job or from one industry to another and to curb "absenteeism." Expressed in this way the intention of the Orders appears to have been merely to tie workers to their employers, as in fact was the case. But ample compensation was given, too ample in the opinion of some. The employers had to observe terms and conditions of employment not less favourable than those provided by collective agreements within their particular industry. This meant that employers who were not parties to these agreements were forced into line, which was not a bad thing.

The Guaranteed Week

There also had to be satisfactory provision for employees' welfare and the Ministry of Labour could insist on provision for the training of workers, if necessary. Subject to specified conditions, a certain minimum time rate had to be assured to workers, generally in the form of a "guaranteed week."

But apart from this, the control of employment was taken out of the hands of firms scheduled under the Orders and put into those of National Service Officers—officials of the Ministry of Labour. No worker could leave his employment or be discharged without permission from one of these officers, but an appeal against his decision could be made to a local appeal board. Absence from work, persistent lateness or "serious misconduct" were also matters which were dealt with by the National Service Officers.

Relief at Withdrawal

It has been widely felt that to deprive employers of adequate disciplinary powers was not conducive to efficiency of production. This feeling was not confined to employers; workers who were pulling their weight were not pleased to have to carry the "passengers." Generally speaking, therefore, employers are relieved at the decision to withdraw about a hundred industries from the scope of the Essential Work Orders, although there is some fear that there may be competition for the available labour for some time to come. There need not be much trepidation among employees either, for they are still protected by the Conditions of Employment and National Arbitration Order. It is true that if they become redundant they can be discharged without reference to the Ministry of Labour, but, even with an Order in force, no National Service Officer, in the present state of industry, could force firms to keep men for whom they would find no work.

So far as the electrical industry is

concerned, the freedom from these restrictions, which will come during May, affects electrical engineering, electrical contracting, electrical cable making and electricity supply. It should be mentioned, however, that this freedom is not a total one—the Control of Engagement Order still applies to men between the ages of 18 and 31 and in certain industries to men above that age.

The call-up for the Services still operates in the case of men up to 30, but those engaged in agriculture have recently been exempted. There is a strong case for the deferment of many of the younger men in the electrical industry until arrangements are made for their replacement, but it seems that this matter is not viewed very sympathetically by the Ministry of Labour.

Output and Demand

AT the beginning of the year it was pointed out here that the recent decline in electricity consumption implied no reduction in the load that had to be coped with by the generating plant available—rather the contrary—and that the need to switch off less essential apparatus from 8 to 10 a.m., and from 4 to 6 p.m., was greater than ever. Although the Electricity Commissioners' returns for January show that the 4,142 million kWh generated (3,917 million sent out) was less by 32 million than the figure for the same month in 1945, this decline was accompanied by an increase of 285,000 kW in the maximum demand. Presumably only the mild weather has prevented consequences of the kind discussed in our issue of February 1st becoming more frequent.

The F.B.I. View

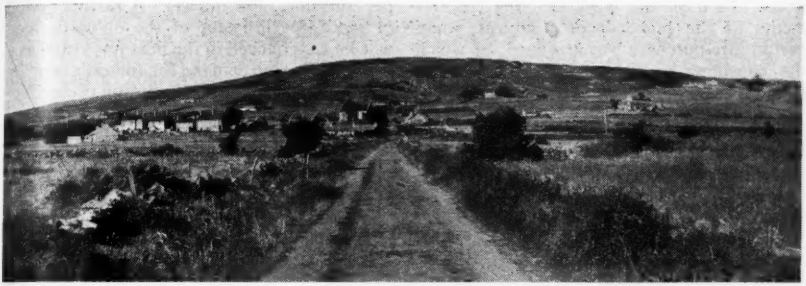
IN its "Statement on Policy," published last week, the Federation of British Industries expresses thoughts which have wide currency just now. Everybody is feeling depressed at the slow return to better conditions; this acts as a drag upon recovery and we seem to have reached an impasse. The proposed way out is not very satisfactory but is probably the only conceivable one: it is that the Government should assure the people of a better share of any increased production which they achieve, and less taxation to enable them to afford it. As to nationalisation, the Federation refuses to believe that it will benefit workers or consumers. It appears to realise, however, that as the Government is committed to a policy of nationalisation, all that it can do is to declare that two great industries—iron and steel and transport—are not fit subjects for such treatment and to call for a clear-cut statement upon the Government's intentions with regard to other industries.

Engineering Careers

TOO much used to depend upon the chance of a youth or his parents having friends competent to give advice on methods of entry into engineering, the training it entailed and its ultimate prospects. This haphazard method is giving way to a systematic placing at the disposal of a candidate the collective experience of his seniors, as in the booklet, "Civil Engineering as a Career" (Institution of Civil Engineers, 1s.). The underlying requirements—a liberal education before specialisation to give scope to "vitality of mind and freedom of thought"—are applicable to all branches of engineering, in which a "realistic outlook and minds receptive of scientific thought" are needed.

Appointing Agents

SIR William McCallum, chairman of the British Chamber of Commerce in the Argentine Republic, writing to the *Manchester Guardian*, warns British manufacturers against the dangers of appointing unsuitable agents in overseas markets. He says that cases have been known of the appointment of people who during the war were anti-Allied in their "ideology." In other instances agents have had inadequate capital and resources, have been experienced only in other lines of business, or have been too large to bother about modest lines of goods which needed energy and concentrated work when other goods could be sold without such trouble. Worst of all is the type which already holds agencies from other countries' manufacturers and secures the representation of British makers merely to stifle competition. Sir William McCallum suggests that manufacturers contemplating the appointment of agents in Argentina should avail themselves of the services of his Chamber of Commerce. This is a sound idea and is applicable to other markets. An alternative is to seek the aid of the Department of Overseas Trade.



Domestic Load Building

A Review of the Position in North Wales

IN these days of short supplies domestic load building cannot be carried out in the fullest sense. All the same, it would not be right to leave this survey of the area of the North Wales Power Company (see *Electrical Review*, December 14th, January 4th and 25th and February 1st) without at least briefly reviewing the company's activities in connection with domestic electrification.

Before the war the North Wales Power Company and its associated company, Electricity Distribution of North Wales & District, Ltd., promoted a vigorous policy for the development of the domestic load, both on existing mains and by extending supplies to rural communities. New consumers were connected at the rate of 6,000 per annum, and this progress was arrested only by the restrictions on new development which came into force at the outbreak of war. In many of the towns and villages served, over three-quarters of the premises have been connected.

The title illustration shows a typical sparsely populated rural area in North Wales (Gwyrfai). In spite of the low average density of population, in many towns and villages over three-quarters of the premises are supplied with electricity, an example being the village of Maentwrog, illustrated below

In Montgomery, claiming to be the oldest borough in the United Kingdom, over 92 per cent. of the premises are connected. In an area where the average density of population was only 116 persons per sq. mile, there were during the period in question very few new houses built, and one of the many problems to solve was the reluctance of the tenants of houses to bear the expense of wiring. The undertaking therefore introduced an assisted wiring scheme, whereby the consumer paid an additional amount through a prepayment meter, until the cost of the installation had been met. About 6,500 premises were wired on this basis.

As the majority of the premises are occupied by families with lower-scale incomes, some further inducement was necessary to enable such consumers to use energy for other purposes than lighting and radio. Schemes were therefore introduced whereby the consumer could hire cookers, kettles and